AN INTEGRATED SERVICE EXCELLENCE MODEL FOR STRATEGIC MILITARY TEST AND EVALUATION FACILITIES: THE CASE OF THE SOUTH AFRICAN NATIONAL DEPARTMENT OF DEFENCE

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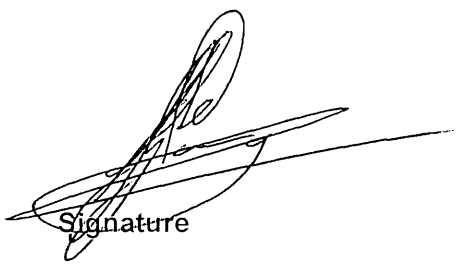
DECLARATION

I declare that: "An Integrated Service Excellence Model for Strategic Military Test and Evaluation Facilities: The Case of the South African National Department of Defence" is my own work, that all sources used or quoted have been indicated and acknowledged by means of complete references, and that this thesis was not previously submitted by me or any other person for degree purposes at this or any other university.



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SOLI DEO GLORIA!

ABSTRACT

Capital-intensive military test and evaluation facilities that are governed within the public entity domain need to deliver effective and efficient services in meeting or exceeding the Department of Defence's requirements and in retaining strategic defence capabilities and technologies. Various business and operational processes currently exist in these facilities, without any common quality assurance, control and performance management systems. The primary objective of this study was to develop an integrated service excellence model in order to obtain and continuously improve service excellence in the services provided by these strategic military test and evaluation facilities, ensuring that all activities necessary to design, develop and implement a test and evaluation service are effective and efficient.

In order to develop an integrated service excellence model, various management tools and approaches to improve quality in the search for service excellence were identified and described. Total Quality Management (TQM), Business Process Re-engineering (BPR), the South African Excellence Model (SAEM) and the Balanced Scorecard (BSC), amongst other productivity and quality models, were researched and evaluated and tested through an empirical study conducted at the various test and evaluation facilities. Financial, human resources and environmental challenges facing the facilities in obtaining service excellence within the boundaries of public governance were explored in order to build the solutions to these challenges into the integrated service excellence model. Effective and efficient deployment of the facilities' resources, as well as the development and incorporation of safety, health and environmental policies and management standards were discussed and measured against national legislation. Applicable military, industrial and commercial quality standards and specifications, such as the International Organisation for Standardisation (ISO) quality management standards and the Republic of South Africa (RSA) military standards, were explored as the burden is on the facilities not only to obtain official accreditation to render specific test and evaluation services, but also to maintain accreditation and to execute the services against these standards.

As corporate governance is a multi-faceted subject impacting on economic efficiency and shareholder's welfare, much emphasis was placed on governance principles through the identification of a framework and governance objectives in which the test

and evaluation facilities operate. Good governance characteristics, such as discipline, transparency, independence, accountability, responsibility, fairness and social responsibility, were identified through the King 2 Report.

This study was conducted amongst senior and top management of the test and evaluation facilities and amongst members of the Department of Defence through an interviewer-administered questionnaire comparing information and data on theory on service excellence, quality management, performance management, governance principles with the interviewer-questionnaire responses to performance indicators at these facilities. Management perceptions and management recommendations contributed to the development of the integrated service excellence model as well as to the future implementation of the model. It was evident through the study that no such integrated model exists to address the test and evaluation needs of the Department of Defence.

Title: An integrated service excellence model for strategic military test and evaluation facilities: The case of the South African National Department of Defence.

OPSOMMING

Kapitaal-intensiewe militêre toets- en evaluasiefasiliteite in die publieke-entiteitdomein moet effektiewe en doeltreffende dienste lewer ten einde die Departement van Verdediging se behoeftes te bevredig en selfs sy verwagtings te oorskry. Die behoud van strategiese vermoëns en tegnologie moet ook verseker word. Tans bestaan daar verskeie besigheids- en operasionele prosesse in die onderskeie fasiliteite, sonder 'n eenvormige kwaliteitsversekering-en-beheerstelsel en prestasiebestuurstelsel. Die primêre doel van hierdie studie was om 'n model vir geïntegreerde diens van uitnemendheid te ontwikkel ten einde 'n uitmuntende diens te lewer, asook om kontinue verbetering van die toets- en evaluasiefasiliteite se diensverskaffing te verseker. Dit is essensieel dat alle aktiwiteite wat nodig is om 'n diens te ontwerp, te ontwikkel en te implementeer, effektief en doeltreffend moet wees.

Ten einde 'n model vir geïntegreerde diens van uitnemendheid te ontwikkel, is verskeie bestuursbenaderinge en hulpmiddels om die kwaliteit van dienslewering te verbeter in die soeke na 'n diens van uitnemendheid ondersoek. Totale kwaliteitsbestuur ("Total Quality Management"), besigheidsproses-herontwerp ("business process re-engineering"), die Suid-Afrikaanse Uitnemendheidsmodel ("South African Excellence Model") en die Gebalanseerde Telkaart ("Balanced Scorecard") is van die produktiwiteits- en kwaliteitsmodelle wat nagevors, geëvalueer en getoets is deur middel van 'n empiriese studie wat in die toets- en evaluasiefasiliteite onderneem is. Finansiële, personeel- en omgewingsuitdagings wat aan die fasiliteite gestel word en binne die grense van staatsbestuur oorbrug moet word ten einde 'n diens van uitnemendheid te lewer, is ondersoek. Die oplossings vir die uitdagings is in die model vir geïntegreerde diens van uitnemendheid vervat ten einde diens van uitnemendheid te verseker. Effektiewe en doeltreffende toedeling van die fasiliteite se hulpbronne sowel as die ontwikkeling en inkorporering van veligheids-, gesondheids- en omgewingsbeleide en bestuurstandaarde is bespreek en aan nasionale wetgewing gemeet. Toepaslike militêre, industriële en kommersiële kwaliteitstandaarde en spesifikasies, soos die "International Organisation for Standardisation (ISO)" kwaliteit-bestuurstandaarde, en die Republiek van Suid-Afrika (RSA) militêre standaarde is ondersoek aangesien die onus op die fasiliteite rus om nie alleenlik amptelike akkreditasie te verwerf ten einde spesifieke toets- en evaluasiedienste te lewer nie, maar ook om die akkreditasie in stand te hou.

Gesien in die lig dat korporatiewe staatsbestuur 'n onderwerp van meervoudige fasette is, met 'n impak op ekonomiese doeltreffendheid en aandeelhouersbelang, is baie klem gelê op staatsbestuursbeginsels deur die identifisering van 'n raamwerk van staatsbestuursdoelwitte waarbinne die toets- en evaluasiefasiliteite funksioneer. Goeie eienskappe van staatsbestuur, soos dissipline, deursigtigheid, onafhanklikheid, aanspreeklikheid, verantwoordelikheid, regverdigheid en sosiale verantwoordelikheid, is deur middel van die King 2-verslag geïdentifiseer.

Die studie is onderneem deur gebruik te maak van 'n onderhoudsvraelys waarin die senior en top bestuurslede van die toets- en evaluasiefasiliteite en lede van die Departement van Verdediging as respondente ondervra is. Inligting en data afkomstig van die teorie oor diens van uitnemendheid, kwaliteitsbestuur, prestasiemeting en staatsbestuursbeginsels is vergelyk met die respondente se terugvoer op die fasiliteite se prestasie-indikators. Die persepsies en aanbevelings van die bestuurslede het 'n groot bydrae tot die ontwikkeling van die model vir geïntegreerde diens van uitnemendheid gelewer, sowel as vir die toekomstige implementering daarvan. Die studie het getoon dat daar nie so 'n model bestaan om die toets- en evaluasiebehoeftes van die Departement van Verdediging aan te spreek nie.

Titel: 'n Model vir geïntegreerde diens van uitnemendheid vir strategiese militêre toets- en evaluasiefasiliteite: Die geval van die Suid Afrikaanse Nasionale Departement van Verdediging.

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CHAPTER 1
ORIENTATION AND PROBLEM STATEMENT

1.1 ORIENTATION

The Department of Defence (DoD) is mandated by The Constitution of the Republic of South Africa (Act 108 of 1996) (hereafter referred to as the Constitution), the Defence Act (Act 42 of 2002), the White Paper on National Defence for the Republic of South Africa (1996) and the Defence Review (1998). These laws and policies direct and guide the functions of the DoD and the South African National Defence Force (SANDF). The mission of the DoD is to defend and protect South Africa in accordance with the Constitution and international law regulating principles. To achieve its mission, certain factors – known as the mission success factors – have been identified and responsibilities assigned to people and organisations within the Department and the defence-related industries (SA, 2003:496).

According to the White Paper on National Defence (SA, 1996:36), the services of an efficient defence industry are required to address the needs and constitutional obligations of the SANDF. The cost-effective purchasing of products and systems and the life-cycle maintenance and support of such systems should be performed by the defence industry, as well as the refurbishment and upgrades of existing equipment.

The business strategy, which is part of the DoD's corporate strategy, in the capital-intensive military-related test and evaluation facilities residing within the DoD, the Department of Public Enterprises (DPE) and the Department of Science and Technology (DST) is explored. The facilities, hereafter referred to as "these facilities", include the Weapon and Ammunition Test Range (Alkantpan) – a division of Armscor within the DoD, the Vehicle and Product Test Facility (Gerotek) – a division of Armscor within the DoD, the Overberg Missile Test Range (OTB) – a division of Denel (Pty) Ltd within the DPE, the Paardefontein Explosives Facility – a division of the CSIR within the DST, and the Paardefontein Antenna Test Range – a division of Armscor within the DoD. The common goal of these facilities is to address defence test and evaluation requirements. The test and evaluation group is considered as being highly strategic with respect to the testing of military equipment in order to achieve a specific purpose with or to gain advantage from the use of the military equipment in the fulfilment of the

DoD's mission (Armscor, 2006:29). In the following paragraphs a brief overview of these facilities is given.

Alkantpan, an ISO 9001 accredited facility, is an all-purpose ballistic test range, equipped for the testing of all kinds of weaponry, ranging from artillery pieces to aircraft and naval systems (SA, 2003:509).

Gerotek, which is ISO 17025 accredited, is a multi-disciplinary facility that provides component and vehicle testing, vehicle promotions, as well as advanced driver training (Armscor, 2006:32). Gerotek's strategic intent is to ensure that purchasing decisions are based on sound, objective test results aligned with end-user requirements and specifications (Armscor, 2006:30).

OTB, a multi-purpose missile, airborne weapons and aircraft test range, specialises in in-flight systems performance measurements for local and international aerospace manufacturers (Denel, 2006:16). OTB is also involved in the tracking of spacecraft flights over Africa by supplying real time data, thus crucially contributing to international space programmes (Denel, 2006:18).

The Paardefontein Explosives Test Range is suitable for vehicular landmine protection testing, validation and certification, as well as human response testing, in order to obtain a better understanding and growing knowledge of military engineering explosives solutions (SA, 2004:33). With its capability to measure human response and survivability as well as the level of injury when subjected to landmine detonation, this test range supports the SANDF in the acquisition of vehicles and technology to counter the landmine threat (CSIR, 2006:28).

The Paardefontein Antenna Test Range caters for antenna testing and is acknowledged as the national antenna test range. It provides services, such as antenna verification, antenna characterisation, radar cross sectional measurements and antenna location on structures, to the SANDF and commercial clients (SA, 2004:104).

In order to develop a service excellence model for the aforementioned strategic military test and evaluation facilities, quality models and approaches by quality theorists were researched. Drucker (1961:85) states that an objective, a goal and a target determine what action is to be taken today to obtain tomorrow's results. He regards management

as a multi-purpose organ that manages a business, managers, work and workers. If one of these were omitted, there would be no business or industrial society (Drucker, 1961:16). Senge (1990:11) states that an organisation cannot be "excellent" in the sense of arriving at permanent excellence, but is always practising the disciplines of learning of becoming better or worse. He distinguishes between management disciplines such as accounting and the five learning disciplines, namely systems thinking, personal mastery, mental models, building shared vision and team learning. Systems thinking, as the fifth discipline, integrates the disciplines into a coherent body of theory and practice, emphasising that the whole can exceed the sum of its parts (Senge, 1990:12).

Edward Deming, who is considered to be the father of modern quality management, preached that for an organisation to achieve the highest level of performance it is essential that it changes its behaviour and adopt new ways of doing business. The points of his famous 14 cardinal points that are relevant to this research environment will be explored, as well as his Plan-Do-Check-Act Cycle (Deming, 2007). Deming (as quoted by Ross, 1995:4) defines quality "as a predictable degree of uniformity and dependability, at low costs and suited to the market". According to Hoyle (2006:8), quality can be defined as "a degree of excellence, conformance with requirements, the totality of characteristics of any entity that bear on its ability to satisfy stated or implied needs, fitness for use, fitness for purpose, freedom from defects imperfections or contamination and delighting customers".

Feigenbaum (2006) defines Total Quality Control (TQC) as "an effective system for integrating the quality development, quality maintenance and quality improvement efforts of the various groups in an organisation so as to enable production and service at the most economical levels which allow full customer satisfaction" (Feigenbaum, 1983:7). Total Quality Management (TQM) combines management methods and economic theory with organisational principles to establish a sound business improvement doctrine as described in Feigenbaum's essential systematic approach ideology (Watson, 2005:52). Oakland (2003:39-40) regards TQM as a vehicle for achieving effective leadership and requires a carefully planned and fully integrated strategy, derived from the mission and assisting any organisation in realising its vision. It is a comprehensive approach to improve competitiveness, effectiveness and flexibility through planning, organising and understanding each activity. Flanagan and Finger (1998:310) state that TQM, which is a business philosophy, is based on the

belief that continuous improvement will occur through dedication and a sharing of constancy of purpose by everyone in the organisation.

Crosby (2007) contributes to service excellence and the quality crisis through his principle of "doing it right the first time". Crosby's prescription for quality improvement is covered in a 14-step programme, and he identifies four absolutes of quality management: the principle that quality is conformance to requirements; the principle that the management system is prevention; the principle that the performance standard is zero defects; and the principle that the measurement system is the cost of quality. He believes that "quality is free" as more savings are created by a quality programme than are the costs of a quality programme. Peters and Waterman (1982:13-15) identify eight attributes of management excellence, namely: a bias for action; staying close to the customer; autonomy and entrepreneurship; productivity through people; hands-on and value driven; stick to the knitting; simple form and lean staff; and simultaneous loose-tight properties. Shonhiwa (2001:101) states that service excellence does not occur in a vacuum, but can only be achieved with a strong supportive system. His ten non-negotiable commandments for service excellence will be studied in order to build his "win/win/win/win" formula into the desired model.

In the strive for excellence, Heller (as quoted by Ali et al., 2001:8) is of the opinion that "good is no longer good enough" and that managers must continually strive to achieve excellence. He expresses a single basic truth: "Whatever you are doing, no matter how well you are doing it, it can be done better still". This "truth" was initiated by KAIZEN and means ongoing improvement; the KAIZEN philosophy assumes that our way of life deserves to be constantly improved. The essence of most Japanese management practices – be it productivity improvement, TQC, quality control circles or labour relations – can be named KAIZEN (Imai, 1986:3).

The above orientation of the environment in which the study is conducted and the meaning of service excellence as described by experts in this field are followed in the next section by stating the problem which led to this research.

1.2 PROBLEM STATEMENT

The White Paper on Defence Related Industries (1999) clearly defines the role of these industries in order to retain strategic defence capabilities and technologies. Defence-related industries comprise various organisations, companies and business units (SA,

2004:8). However, the Minister of Defence instructed that a proper study be conducted on the location of the strategic capabilities in order to enable the DoD to remain at the cutting edge of defence-related technology. (At the time of submission of the thesis, this study was still in progress.) A single, integrated Defence Evaluation and Research Institute (DERI), accountable to the DoD, is being considered (Armscor, 2006:5). The DERI should play a vital role in the preparation and employment of capabilities in the total value chain of defence activities (De Necker, 2006:20). Facility, land and environmental management in the DoD strive for the efficient management of these entities to sustain long-term and cost-effective operations (SA, 2003:509). Management includes the maintenance of highly specialised infrastructure and equipment, as well as world-class expertise (Armscor, 2006:5).

The problem to be addressed in this study is how to ensure that test and evaluation services provided by the test and evaluation facilities governed within the public entity domain, are efficient and effective in meeting or exceeding the customer's requirements. Currently, various business and operational processes exist in these facilities without common quality assurance and control and performance management systems. Not all of these facilities have adopted the International Organisation for Standardisation (ISO) quality management system standards. The Balanced Scorecard (BSC) has been implemented in some of the facilities, although diverted outcomes exist in the different business units and facilities where it has been implemented. The South African Excellence Model (SAEM) has been introduced or implemented in two of the facilities, whilst one of the facilities does not use any of the above-mentioned systems or management tools and has developed its own unique performance management system.

In order to address the problem, a number of questions must be answered, as stated in the next paragraph.

1.3 RESEARCH QUESTIONS

The research aims to answer the following key questions:

- What are the quality management tools and approaches to be used by these facilities in order to obtain service excellence, and to what extent are these tools and approaches currently in use?

- What are the challenges these facilities have to deal with to obtain service excellence, and how successful are they currently in addressing these challenges?
- To what quality standards and specifications should these facilities deliver the services in order to be effective and efficient, and what is the current status?

The answers to the above questions will determine the gap between the theoretical pillars of service excellence and the current reality of service delivery by these facilities. The applicable existing models of service excellence of experts will be integrated into this comprehensive model as part of the theoretical pillars. Addressing the gap analysis leads to the objectives of this study and the purpose of the model as described in the next section.

1.4 RESEARCH OBJECTIVES

1.4.1 *Primary objective*

The primary objective of this study is to develop an integrated service excellence model in order to obtain and continuously improve service excellence in services provided by strategic military test and evaluation facilities, thereby ensuring that all activities necessary to design, develop and implement a test and evaluation service are effective and efficient.

To achieve this objective a comparison is made of the theories on service excellence, current performance indicators, management perceptions and management recommendations that were gathered in an empirical study. This comparison requires an in-depth look at the secondary objectives in the next paragraph.

1.4.2 Secondary objectives

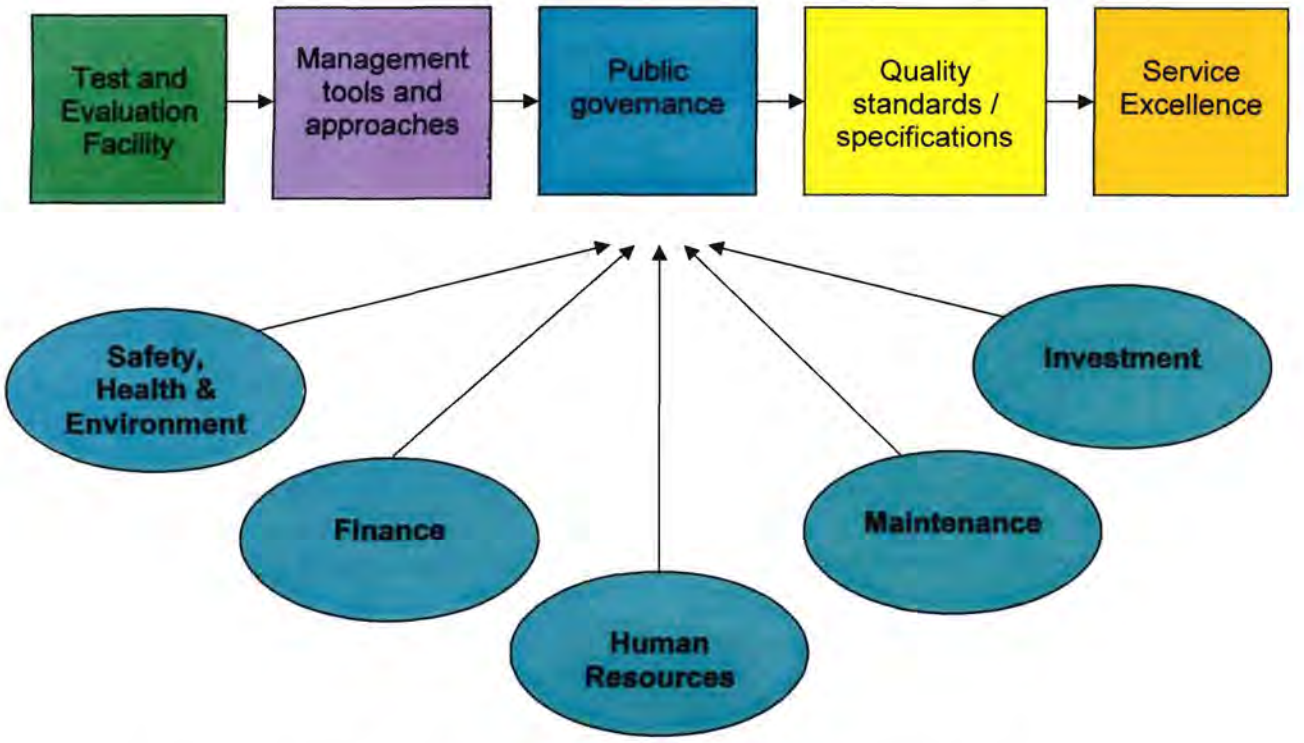
The secondary objectives investigated in this study are the following:

- To identify and describe various management tools and approaches to improve quality in the search for service excellence, and to determine to which extent these tools and approaches are currently being used.

- To determine and explore the challenges that have to be addressed to obtain service excellence, and to determine the current success rate of dealing with these challenges.
- To qualify the quality standards and specifications of efficiency and effectiveness of service delivery in test and evaluation facilities and to determine the current status.

Diagram 1 depicts elements in the model that will be developed by the researcher in order to achieve service excellence.

Diagram 1: Elements in the integrated test and evaluation service excellence model



1.5 HYPOTHESIS AND CENTRAL THEORETICAL STATEMENTS

The following hypothesis and central theoretical statements can be made regarding an integrated service excellence model for strategic test and evaluation facilities:

The hypothesis of this research is that the test and evaluation facilities delivering test and evaluation services to the DoD do not have an integrated service excellence model in place to ensure service excellence in addressing the test and evaluation needs of the Department.

Various management tools and approaches are available to improve total quality in the search for service excellence. Performance management is the process of measuring or assessing progress towards achieving predetermined strategic goals (Performance Management, 2007). TQM is a systems approach considering every interaction between the various elements of the organisation in order to seek and exploit opportunities for improvement at all levels (Ross, 1995:2-3). Various TQM tools, for example the Pareto Principle, control charts and flow charts, to mention but a few, can be put to use in quality improvement efforts (Department of Engineering, 2007). The BSC is a concept for measuring an organisation's activities in terms of its vision and strategic objectives. It provides a comprehensive view of the performance of the business, including the financial perspective, customer perspective, business process perspective and the learning and growth perspective (Balanced Scorecard, 2007). The SAEM is a management tool for improving the efficiency and effectiveness of service delivery. The dynamics of the SAEM can be described in two categories, namely enablers and results, indicating what is done by an organisation and how it operates (SAEF, 1999:M2-11).

There are specific challenges within the boundaries of public governance that influence service excellence. Excellent resource management, including the provision or maintenance of essential services in the DoD, is one of the mission success factors (SA, 2003:496, 498). The integrated control of resources remains a management challenge as different resources are controlled by various departments. Resources have to be planned, then acquired, deployed, maintained and eventually disposed of (Hoyle, 2006:305). Resource management is the efficient and effective deployment of an organisation's resources and includes amongst other things financial resources, human skills, inventory and information technology (Resource Management, 2008).

Safety, health and environmental (SHE) policy and management standards need to be developed and incorporated in the integrated model in order to provide a risk-based SHE management system that is consistent with national legislation, ISO 14001 and other relevant standards that support SHE best practice (Armscor, 2006:43). The achievement of co-operative environmental governance as advocated in national environmental policies is regarded as a priority in the delivery of services (SA, 2003:509).

Various quality standards and specifications exist for effective and efficient test and evaluation service delivery. ISO created quality management standards to certify the

processes and the system of an organisation (Quality Management, 2007). ISO 9001:2000 covers a generic management standard, ISO 17025 was developed to cover the requirements that are relevant to the scope of testing and calibration services, whilst ISO 9000 contains the general concepts and principles that apply to quality management as well as to quality management systems (Quality Network, 2006). Effective and efficient services can only be delivered when the activities described in the management system are carried out as described (Hoyle, 2006:109-110). The Republic of South Africa (RSA) Military Standards Steering Committee (RMSS) facilitates, coordinates and oversees formal standardisation activity in the RSA military environment. The formal standardisation processes support the core business functions in their endeavours to supply cost-effective and efficient products, services and processes to the military community (Armscor, 2007).

1.6 RESEARCH METHODOLOGY

1.6.1 Literature study

A literature study of primary and secondary literature was undertaken with the view to developing an integrated service excellence model. The literature study included various management tools and approaches developed by quality theorists. The applicability of these approaches and models to the test and evaluation facilities was studied in the literature review in order to develop an integrated service excellence model to address the problem statement. The model has to ensure that test and evaluation services are efficient and effective. The culture of acceptance of responsibility by individuals and groups for continuous process improvement must form an integral part of the excellence model.

Resource management, with specific reference to financial and human resources as well as environmental issues, was researched within the boundaries of public and corporate governance. The transparency, competitiveness and cost-effectiveness *were declared* through this literature study. The literature study set the statutory frame-work and structure, as well as an outline of useful rules, regulations and requirements in which the model has to be operational. Safety, health and environmental issues were addressed in order to ensure that the environment in which these facilities operate is not harmful to people's health or wellbeing.

Quality standards and specifications were investigated in order to determine the relevant quality needs, requirements and expectations that should be built into the model. Military, industrial and commercial quality standards were investigated so that the model complies with scientific test and evaluation standards.

The following databases were consulted to ascertain the availability of study material for the purpose of this research:

- Catalogue of current and completed research projects database (NEXUS).
- Catalogue of books: Ferdinand Postma Library (North-West University).
- Catalogue of books: UNISA Library.
- Catalogue of books: Merensky Library, University of Pretoria.
- Catalogue of books: Gauteng Provincial Library and Information Services.
- Armscor Intranet and Web site.
- Government publications.
- Internet searches.

1.6.2 Empirical study

In view of the objective of gathering information and data to develop an integrated service excellence model, an empirical study was undertaken to gather information and obtain data from participants at the test and evaluation facilities, the SANDF and the Defence Secretariat. A questionnaire was designed for comparing information and data between theory on service excellence and current performance indicators as well as management perceptions and recommendations. Cooper and Schindler (2001:141) stress the fact that participants' ideas and experiences on important issues or aspects need to be covered in the product of questioning.

The questions of the designed questionnaire were formulated according to theoretical information gathered during the literature study as described in the secondary objectives. In selecting appropriate question content, it needs to be decided if the question should be asked, if the question is of proper scope and coverage, if the respondent can adequately answer the question and if the respondent will willingly answer the question (Cooper & Schindler, 2001:336). Multiple-choice questions, 5-point Likert-type scale questions and open-ended questions were formulated to gather the required data. Multiple-choice questions are used where specific alternatives need

to be selected by the respondent, whilst open-ended questions are used to gather the respondents' own ideas and recommendations. Likert-type scale is used to gather data on attitudes and perceptions (Struwig & Stead, 2001:92, 94).

As qualitative research focuses primarily on the depth or the richness of data (Struwig & Stead, 2001:121), the research was conducted on all twenty-six (26) members of the management teams of the facilities as mentioned (100%) and eight (8) of the twelve (12) members (67%) of the governance and migration workgroup on the establishment of the DERI representing the SANDF and the Defence Secretariat. The total of thirty-four (34) respondents' viewpoints and perceptions of their individual and team's knowledge, expertise and involvement in specific systems, principles and processes needed in the effective and efficient delivery of test and evaluation services, represents the managerial role players and decision-makers in the test and evaluation facilities mentioned and the workgroup on the establishment of the DERI. This qualitative study provides the freedom and natural development of action and representation that is needed for the depth of the data to reach the best solution to the research problem, as is explained by Henning et al. (2004:3).

According to Cooper and Schindler (2001:209), "the ideal study should be designed and controlled for precise and unambiguous measurement of the variables". Henning et al. (2004:3) describe a variable as "a component of the phenomenon that is studied". Three major criteria for evaluating a measurement tool exist and Cooper and Schindler (2001:210) are of the opinion that this tool should be an accurate counter or indicator of what is measured. They regard validity, reliability and practicality as essential for sound measurement. Validity refers to the extent to which a tool measures what it actually should measure, whilst reliability has to do with the accuracy and precision of the measurement procedure. Henning et al. (2004:148) are of the opinion that validation is to check for bias, neglect, lack of precision and to critically question all procedures and decisions. Struwig and Stead (2001:133-134) view reliability as being synonymous with consistency. Observation, text analysis and interviews are ways to address reliability. Practicality, according to Cooper and Schindler (2001:210, 218), is concerned with a wide range of economic factors, convenience and interpretability. The number of measurement questions and the data collection method will have an influence on the observation time and therefore the costs, and will be dictated by economic factors. A questionnaire should have a set of detailed but clear instructions, while key pieces of information to make interpretation of the results possible should be provided by the designer of the data collection.

1.7 CHAPTER DIVISIONS

Chapter 1 of the thesis poses the research problem and the relevant research questions of this study, and explains the research methodology used. Chapter 2 deals with various management tools and approaches to improve quality in the search for service excellence. Total Quality Management (TQM), business process re-engineering, organisational process analysis, the South African Excellence Model (SAEM), the Balanced Scorecard (BSC) and other productivity and quality models are evaluated in this chapter.

Challenges facing the facilities in obtaining service excellence within the boundaries of public governance are discussed in chapter 3. Financial matters, human resources as well as environmental issues are investigated. Capital investment options, business cases, budgets, competent personnel requirements, maintenance decisions, safety, health and environmental management and applicable Acts are described. The various quality standards and specifications needed for the test and evaluation facilities to deliver effective and efficient services are also discussed in chapter 3. The applicable ISO standards and accreditation as well as specific military specifications and standards are investigated.

Chapter 4 discusses the analysis of the empirical investigation conducted into the essential quality standards and specifications, the challenges identified for the facilities, and the management tools and approaches available to assure service excellence. The chapter concludes with the empirical findings of the research done. Findings with regard to the primary and secondary objectives and the integrated service excellence model are presented in chapter 5. The research concludes with recommendations for the implementation of the integrated service excellence model at the strategic military test and evaluation facilities.

1.8 CONCLUSION

The aim of this orientation chapter was to explain the problem that led to the research and to set the objectives of the research study. The environment in which the study was conducted was explained by giving a brief overview of the military test and evaluation facilities as well as an overview of the theoretical literature that was used to conduct the research study. The problem statement was enlightened by the hypothesis and central theoretical statements, followed by a description of the research

methodology used. The contents of the different chapters were stated as exposition of the research that was done.

In the next chapter quality management approaches and measurement methodology will be discussed and evaluated in order to improve quality in the search for service excellence and to be included in the integrated service excellence model, which is the primary objective of this research study.

CHAPTER 2
QUALITY MANAGEMENT APPROACHES AND MEASUREMENT METHODOLOGY

2.1 INTRODUCTION

The research problem, questions and objectives of this study were posed in chapter 1 in order to set direction for the development of an integrated service excellence model for obtaining and continuously improving service excellence in the services provided by strategic military test and evaluation facilities. In order to ensure that all activities are covered that are necessary to design, develop and implement a test and evaluation service in an effective and efficient manner, chapter 2 focuses on the secondary objectives - specifically on the management tools and approaches to be used to obtain service excellence.

Effective service delivery should be the result of a service excellence model in which the quality of services can be measured and continuous process improvement be initiated. Various quality management models and approaches developed by quality theorists are explored in this chapter, in order to be able to develop an integrated service excellence model for strategic military test and evaluation facilities. The viewpoints of the antecedents of modern quality form the introduction, after which modern approaches to quality, total quality management and other process improvement techniques are discussed. As the model is to incorporate a performance management system, current measurement tools and techniques as well as performance measurement systems are researched to ensure an optimum and practical performance management system.

The aim of this chapter is to gain theoretical insight into the development of a service excellence model that will steer the test and evaluation facilities towards service excellence.

2.2 CONCEPTUALISING KEY CONCEPTS

In order to arrive at operational definitions for key concepts utilised in this study, it is necessary to clarify the origin and meaning of key concepts such as quality, quality management, Total Quality Management (TQM), continuous performance

improvement, performance management, Business Process Re-engineering (BPR), Business Process Improvement (BPI) and service excellence.

2.2.1 Quality and Quality Management

The meaning of the term quality has developed over many years. According to the American Society for Quality Source (Quality, 2008), quality is a "subjective term for which each person has his or her own definition". In technical usage, however, quality can be seen as "the characteristics of a product or service that bear on its ability to satisfy stated or implied needs or as a product or service free of deficiencies".

The above definition is simplified through the following views. According to Oakland (2003:4), "quality is simply to meet the customer's requirements" and this has been expressed in many ways by other authors: Juran (1992:14) sees it as "processes required to meet customers' needs"; Deming (1986:5) argues that "quality should be aimed at the needs of the consumer, present and future"; Crosby (1984:58) defines quality as "conformance to requirements"; and to Feigenbaum (1983:7) quality is "the total composite product and service characteristics of marketing, engineering, manufacturing and maintenance through which the product and service in use will meet the expectation by the customer". These views can be summarised in what is regarded as the most progressive view of quality, namely that "quality is defined by the customer on what his or her entire experience is with a product or service received" (Quality, 2008). Stark (2008) adds to this view by stating that "quality is a description of the culture and attitude of an organisation that aims to provide customers with products and services that satisfy their needs".

By using the above progressive view of quality as the basis on which this study explored the integrated service excellence model, the management of all activities necessary to provide a service that satisfies clients' needs has taken place – the so-called "quality management". Quality management is therefore a method for ensuring that all activities necessary to design, develop and implement a service, including policy, objectives and responsibilities, are effective and efficient in terms of the clients' requirements (Quality Management, 2008).

The phenomenon of quality management, including quality control and quality improvement, leads to the next concept, that of total quality management.

2.2.2 Total Quality Management (TQM)

TQM is a management strategy aimed at embedding awareness of quality, not only in all organisational processes but also in the total supply chain and life cycle of the product or service. TQM deals with all the usual definitions of quality and its complexities, as well as with the steps like planning, organising, controlling, leadership and staff provisioning in the management system (Total Quality Management, 2008).

Expressions or definitions are given by authors who elucidate the meaning of TQM. Maxon (1993:7) is of opinion that the concept of TQM emerged from the work on quality of Deming, Juran and Crosby and originated in Japan but was enthusiastically embraced worldwide. Theorists of the Production Engineering Research Association (PERATEC) regard TQM as "a philosophy of management that strives to make the best use of all available resources and opportunities by constant improvement" and as "the key business improvement strategy as well as the key management issue of the future because it is essential for efficiency and competitiveness" (PERATEC, 1994:3); Hunt (1993:10) describes TQM as "both a philosophy and a set of guiding concepts, principles and practises that represent the foundation of a continuously improving organisation"; and according to Du Toit et al. (2002:208), TQM relates to an evolving system where processes, products and services are continuously improved.

The above expressions postulate to the International Organisation for Standardisation's (ISO) definition of TQM, namely that "TQM is a management approach for an organisation, centred on quality, based on the participation of all its members and aiming at long-term success through customer satisfaction and benefits to all members of the organisation and society" (Total Quality Management, 2008). The service excellence model in this study relies on this operational definition of TQM.

2.2.3 Performance Improvement and Performance Management

Customers recognise that quality is an important attribute in products and services, which indicates that performance improvement is synonymous with quality improvement – covering product improvement, process improvement and people based improvement (Quality management, 2008). The following definitions help to clarify the meaning of performance improvement:

Gerson and Gerson (2006:13-14) define performance improvement as "something that is intrinsically rewarding" where performers "must receive self-satisfaction from getting

better at whatever they are doing if they are to remain intrinsically motivated to repeat the task again and again. Performance improvement is only possible if attention is paid to both the mental state and the emotions of the performer. McLaren (2007:30) adds to this and defines continuous process improvement as a "planned, organised and systematic process of ongoing, incremental and strategic change of existing practises aimed at improving the organisation's performance".

Armstrong and Baron (2008) define performance management as "a process which contributes to the effective management of individuals and teams in order to achieve high levels of organisational performance". It is about establishing a culture in which individuals and teams take responsibility for the continuous improvement of business processes in a holistic manner. They stress that "at its best, performance management is a tool to ensure that managers manage effectively and that they ensure the people or teams they manage". To conclude their argument, Armstrong and Baron (2008) elucidate that performance management should focus on broader strategic issues and longer-term goals integrating various aspects of business, people management, individuals and teams.

Performance improvement, the development of individuals and teams, as well as managing behaviour fostering better working relationships, are ingredients of effective performance management that will be incorporated in the service excellence model.

2.2.4 Business Process Re-engineering (BPR) versus Business Process Improvement (BPI)

Business Process Re-engineering (BPR) can be regarded as a management approach aiming at improvements through the elevation of effectiveness and efficiency of the processes in and across organisations, and is defined by Oakland (2003:194) as "the fundamental rethink and radical redesign of a business process, its structure and associated management systems, to deliver major or step improvements in performance". Hammer and Champy (2008) build on the above definition by adding that BPR needs to "achieve dramatic improvements in critical contemporary measures of performance, such as cost, quality, service and speed". Johansson (2008) relates BPR to other process-orientated views such as TQM by escalating the efforts of TQM to enlighten process orientation as a strategic tool and core competence of an organisation.

Business Process Improvement (BPI) is defined by Harrington (1991:20) as "a systematic methodology developed to help an organisation make significant advances in the way its business processes operate". This systematic approach needs to define the organisation's strategic goals and purpose, determine its customers, and align the business processes to realise the organisation's goals.

As the goal of BPI is a radical or significant change in the performance of an organisation and BPR has to do with the radical redesign of a business process aiming at improvements, there are no significant differences for the mentioned terminologies in this study - all relevant improvement actions will be incorporated in the excellence model.

2.2.5 Service Excellence

Service excellence is regarded by Shonhiwa (2001:32) as an "all-round overwhelming phenomenon incorporating the time taken to serve, the quality of the product or service, the form and speed of delivery as well as the perception of value for money elicited in the customer". The development and transparency of customer service "standards" or "promises" to customers or what clients aspire towards, are best developed in harmony with staff consultation and customer research activities and will lead to continuous service improvement resulting in customer service excellence (Customer Service Excellence, 2008).

In conclusion, service excellence can be seen as a way of working, a way of interacting and working together with others; not only as a "good" attitude but as a "great" one (Service Excellence, 2008).

Table 1 depicts a summary of the definitions of the key concepts as described by some of the above-mentioned theorists.

Table 1: Summary of key concepts

Concepts	Theorists	Key contributions
Quality	Deming (1986)	Quality is aimed at the needs of the consumer.
	Juran (1992)	Processes required meeting the customers' needs.
	Crosby (1984)	Quality is conformance to requirements.
TQM	PERATEC (1994)	Philosophy of management making use of available resources and opportunities by constant improvement.
	Hunt (1993)	Foundation of a continuously improving organisation.
	Du Toit et al. (2002)	TQM relates to an evolving system which was developed as a result of successful practises in an organisation into continuously improves processes, products and services.
BPR/BPI	Oakland (2003)	The fundamental rethink and radical redesign of a business process.
	Harrington (1991)	Systematic methodology making significant advances in the way business processes are operated.
	Hammer and Champy (2008)	BPR needs to "achieve dramatic improvements in critical contemporary measures of performance, such as cost, quality, service and speed".
Performance Management	Armstrong and Baron (2008)	A process contributing to the effective management of individuals and teams to achieve high performance.

Concepts	Theorists	Key contributions
Service Excellence	Shonhiwa (2001)	It is the perception of value elicited in the customer.

In the next section the approaches and principles of the quality theorists are discussed, as this forms the basis and background of the development of the service excellence model of this study.

2.3 QUALITY MANAGEMENT APPROACHES AND PRINCIPLES

Quality management systems as implemented today are the result of research done on quality-related issues by quality specialists who can be regarded as the antecedents of modern quality management. The next section relates the quality approaches of these antecedents, followed by the modern approaches to quality and performance improvement.

2.3.1 Antecedents of modern Quality Management

The contributions to the modern approaches to quality management are as follows:

2.3.1.1 Deming's universal 14 points

Ishikawa (1985:17) regards Deming as the one who introduced quality control to Japan by presenting a seminar on how to use the cycle of Plan-Do-Check-Action (the so-called Deming cycle) to enhance quality as well as process control through the use of control charts. The cycle of design, production, sales and market research is followed by another cycle beginning with redesigning based on the experience obtained in the first cycle. In this manner, redesigning of quality occurs continuously and quality will improve on a constant basis (Ishikawa, 1985:55). Deming (1993:17) is of opinion that knowledge is an essential ingredient and that hard work, best efforts and best intentions will not by themselves produce quality or a market. Learning and the application of profound knowledge is necessary.

Deming (1986:23-92) preaches the following 14 points to management:

- Create constancy of purpose towards improvement of product and service. Innovative ideas and constantly improved products or services with unshakable commitment from top management will keep an organisation solvent and ahead of competition.
- Adopt the new philosophy where no one can live any longer with commonly accepted levels of delays, mistakes and defective workmanship.
- Cease dependence on mass inspection. Require, instead, statistical evidence that quality is built in. Inspection to improve quality is too late, ineffective and costly, whilst quality is obtained from improvement of the production process.
- End the practise of awarding business on the basis of price tag alone. Price does not mean anything if the quality of the product being purchased is not measured.
- It is management's job to work continually on the system to find problems and to improve constantly the system of production and service. Putting out fires is not improvement of the system.
- Institute modern methods of training on the job. Training must be reconstructed for management to learn about the company to understand and act on problems that rob the employee of the possibility to carry out his task with satisfaction.
- Institute modern methods of supervision and leadership of production workers and management. The responsibility of foremen must be changed from numbers to quality. Management's job is not supervision but leadership and has to focus on sources of improvement.
- Drive out fear, so that everyone may work effectively for the company as no one can put in his best performance unless he feels secure.
- Break down barriers between departments. People in different departments must be aware of problems encountered in other departments due to their input or choices of various materials and specifications in the production process. Teamwork is needed throughout the organisation.
- Eliminate numerical goals, posters and slogans for the workforce asking for new levels of productivity without providing methods. Exhortations and posters generate frustration and resentment. It is management's main responsibility to improve the system and to remove any special causes detected by statistical methods.

- Eliminate work standards that prescribe numerical quotas as a quota is a fortress against improvement of quality and productivity and totally incompatible with never-ending improvement. Internal numerical goals for management, without a method, are a burlesque.
- Remove barriers that stand between the employee and his right to pride of workmanship. Annual rating of performance or merit rating is regarded as one of the "crippling diseases" of an organisation and should be dealt with carefully. Acceptable workmanship should be defined in order for an employee to take pride in his work.
- Institute a vigorous programme of education and retraining to enhance self-improvement. An organisation needs not only good people but also people that are improving with education.
- Create a structure in top management that will continually force the execution of the above 13 points, in order to accomplish the transformation.

2.3.1.2 Juran's 10 steps to quality improvement

Ishikawa (1985:19) is of the opinion that Juran transformed Japan's quality control activities and created an atmosphere where quality control was regarded as a tool of management dealing with all components in business and not only with technology in factories. Juran (as quoted by Ishikawa, 1985:36) warns that "it requires ten years for quality control education to take effect". Quality control education is needed for each level in the organisation, training courses must be long-term orientated and education must be continued permanently (Ishikawa, 1985:38).

Juran (1992:14-15) argues that managing for quality is done by using the three managerial processes of planning, control and improvement, and is referred to as the Juran Trilogy. Quality planning is the activity of developing the products and processes required to meet customers' needs, whilst quality control evaluates actual quality performance against quality goals. Quality improvement means the organised creation of beneficial change and is the process of raising quality performance to unprecedented levels (Juran, 1989:28). Juran (as quoted by Oakland, 1993:444-445) introduced the following ten steps to quality improvement:

- Build awareness of the need and opportunity for improvement.
- Establish goals for improvement.

- Organise to reach the goals by establishing a quality council, identifying problems, selecting projects, appointing teams and the designation of facilitators.
- Provide training.
- Carry out projects to solve problems as all improvements take place project by project.
- Report progress.
- Give recognition through a reward system.
- Communicate results.
- Keep score.
- Maintain momentum by making annual improvement part of the regular systems and processes of the company.

Juran (1989:79) values the establishment of a quality council very highly; such a quality council would be well advised to anticipate the troublesome questions and to provide answers at the time going into the annual quality improvement initiative.

2.3.1.3 Feigenbaum's systematic approach ideology

According to Feigenbaum (1983:78), the systems approach to quality begins with the basic principle of total quality control in all areas of an organisation, and that customer satisfaction cannot be achieved by concentrating on any one area only. He defines a total quality system as "the agreed company wide and plant wide operating work structure, documented in effective, integrated technical and managerial procedures, for guiding the coordinated actions of the workforce, the machines and the information of the company and plant in the best and most practical ways to assure customer quality satisfaction and economical costs of quality".

Systems engineering, systems management, systems economics and systems measurements are regarded by Feigenbaum (1983:84-85) as activities to be applied to modern quality control to reach efficiency and effectiveness. He defines systems engineering as the technological process creating and structuring effective people-machine-information quality systems, whereas systems management is the administrative process of assuring effective operation of the quality system. System economics is the measurement and control process to guide resource allocation of the people-machine content of the quality system in the most effective way, whilst the role

to evaluate the effectiveness in which the quality system meets its objectives and goals, is fulfilled by systems measurements.

Feigenbaum (1983:106-108) identifies an effective quality system by its accomplishments in 12 fundamental areas:

- It controls quality on an integrated, organisation-wide basis, starting with the marketing conception and product design and continuing through procurement, production and service delivery.
- It provides quality decision-making ties with upper management in order to integrate high level control of operations, based on fundamental general management quality policy.
- It fosters a sufficient budgetary base and technical competence to permit preventive effort in the product design and manufacturing process.
- It establishes quality control as an asset of disciplines to be applied in a systematic way throughout the organisation.
- It builds in quality control's coupling with customers on a positive feed forward and feedback basis, providing data about customer-use requirements beforehand and not after problems have exploded.
- It clearly structures, reports and allocates quality costs in a systematic way throughout the different areas.
- It makes quality motivation a continuous process of quality goals, quality measurements and an attitude of quality-mindedness.
- It structures a unique technological contribution to the organisation through quality and reliable engineering work in order to meet production demands for a direct quality technical role.
- It provides for continuously measuring and monitoring customer quality satisfaction leading to immediate corrective action.
- It provides good product service rapidly and economically in order to generate customer acceptance.
- It integrates product-safety and product-liability-control with all aspects of the quality programme.
- It adds a major, organisation wide scope to the quality function.

It is essential to organise quality effectively and economically throughout the organisation, and Feigenbaum (1983:110, 130) applies quality cost as a tool to assist in

decision-making on quality programmes, assignment of resources, as a budgeting tool where it provides guidance to budget the necessary expenditures for accomplishing the desired quality-control programmes and as a predictive tool to provide controls to evaluate and assure performance in relation to the goals and objectives of an organisation. Feigenbaum (1983:149, 213) further postulates that except for quality circles and Quality of Working Life (QWL) as participative programmes and approaches to achieve a spirit of quality-mindedness, other motivational programmes, such as the Zero Defects approach, Employee Suggestion Programmes, Management by Objectives and Quality Goal Setting, also contribute to the achievement of quality commitment. The aim of quality circles, which are formed by a group of employees dealing with the same activities, is to pinpoint, examine and analyse problems and to solve problems relating to quality, productivity, safety, work relations, cost and housekeeping (Feigenbaum, 1983:210). QWL is described by Feigenbaum (1983:212) as the principle where commitment to quality results most naturally where employees are closely involved in decisions affecting their work.

Quality values to the customer need to be promoted and customer-attitude determination, in order to obtain and measure the opinions, impressions, reactions and degree of satisfaction of the overall efforts of the company by customers, need to be evaluated (Feigenbaum, 1983:272). According to Feigenbaum (1983:829) the total quality programme provides the discipline, methodology and techniques to assure consistent high quality, which is in essence a way of managing.

2.3.1.4 Crosby's 14 steps to quality improvement

Crosby (1984:58-68) distinguishes four absolutes as the basic concepts of the quality improvement process and continuous by saying that "there is no such thing as a quality problem". He defines quality as the conformance to requirements as the first absolute where quality improvement is built on getting everyone to do it right the first time. The second absolute is that the system of quality is prevention where preventive action is needed by looking at the process and identifies opportunities for error and eliminates the causes of problems. Zero defects as the performance standard is regarded by Crosby (1984:74-84) as the third absolute. The performance standard is the device for making an entity happen by recognising the importance of all the actions needed and the acknowledgement that all results in an entity are made by people. The last absolute is that the measurement of quality is the price of non-conformance where the

rule is "to take everything that would not have to be done if everything were done right the first time and count that as the price of non-conformance" (Crosby, 1984:86).

Crosby (1979:132-139) offers management the following 14 steps to quality improvement:

- Make it clear that management is committed to quality, with the emphasis on the need for defect prevention.
- Form quality improvement teams with representatives from each department to commit operation to action.
- Determine where current and potential quality problems lie and establish quality measures for each area of activity.
- Evaluate the cost of quality and explain its use as a management tool to indicate where corrective action will be profitable for an entity.
- Raise the quality awareness and personal concern of all employees by providing visible evidence of the concern for quality improvement through different means of communication.
- Take actions to correct problems identified through previous steps.
- Establish an ad hoc committee for the zero defects programme in order to communicate the thought that everyone should do things right the first time.
- Train supervisors to actively carry out their part of the quality improvement programme.
- Hold a "zero defects day" to let all employees realise that there has been a change in performance standards.
- Encourage individuals to establish improvement goals for themselves and their groups which are specific and capable of being measured.
- Encourage employees to communicate to management the obstacles they face in attaining their improvement goals.
- Recognise and appreciate those who participate through award programmes.
- Establish quality councils to communicate on a regular basis and to determine actions necessary to upgrade and improve the solid quality programme being installed.
- Do it all over again to emphasise that the quality improvement programme never ends.

The above contribution to quality related issues by the antecedents form the basis on which modern approaches towards quality improvement were formalised, which will be dealt with in the next section.

2.3.2 Modern approaches to Quality Improvement

In the following sections modern approaches to and views on quality improvement are highlighted. The views on TQM, systems thinking, Business Process Improvement/ Re-engineering, service delivery improvement/excellence and Six Sigma form an important background to the development of the integrated service excellence model of the test and evaluation facilities.

2.3.2.1 Views on Total Quality Management (TQM)

Saunders and Preston (1994:194) believe that TQM was originally developed in manufacturing organisations, but that its value to other organisations was soon discovered. The ability to control processes and the reduction of waste were promotion efforts of TQM to the public sector, non-profit organisations, public health systems and small businesses. Weintraub (1993:39) states that all work is a process that can be improved through reducing cycle time, achieving breakthroughs and implementing innovations.

Flanagan and Finger (1998:308) explain that TQM is an evolutionary strategy that focuses on continuous process improvement and preceded business process re-engineering which aimed at radically redesigning processes to improve an organisation's competitiveness dramatically. They associate TQM with getting services and products right the first time and do not believe in waiting until the end before checking for errors. Flanagan and Finger (1998:310) further believe that TQM will occur through dedication to continuous improvement and the sharing of a constancy of purpose by everybody in the organisation. TQM challenges management to empower people to improve continually and to enjoy and celebrate their achievements.

Goh and Xie (1994:4-9) argue that TQM programmes have encompassed concepts such as "zero defect" and "do it right the first time", which they consider as ideals rather than ways to achieve such ideals. A more positive and aggressive management attitude and "do it better each time" philosophy are needed in the increasingly competitive market.

Oakland (2003:39) regards TQM as the vehicle for achieving excellence in leadership as it covers the entire organisation, including all the people, all the functions as well as external organisations and suppliers. He argues that the core of TQM is the customer/supplier relationships, both internally and externally, and that processes exist within these interfaces to convert inputs to outputs. Oakland (2003:39-40) identifies the following four Ps and four Cs in his "TQM model" to deliver excellence in leadership:

- Planning – where the vision, mission, policies and strategies needed for constancy of purpose and long-term success must be developed and aligned with the organisational structure.
- Performance – where key performance results are measured, reviewed and improved against performance goals.
- Processes – where a system for managing processes is developed, implemented and continuously improved.
- People – where empowerment and teamwork should be stimulated to encourage creativity and innovation, as well as to encourage and support training, education and learning activities. People should be supported to achieve plans, goals, objectives and targets.
- Customers – where involvement and understanding of customer needs are essential in order to establish and participate in partnerships towards continuous improvement.
- Commitment – where personal and active involvement in quality and improvement activities are needed, and to review and improve the effectiveness of own leadership.
- Culture – where the values and ethics to support the creation of a total quality culture and behaviour need to be developed to ensure that creativity, innovation and learning activities are developed and implemented.
- Communications – where communication and collaboration are stimulated and encouraged in an accessible manner in order to communicate the vision, values, mission, policies and strategies.

Through the above-mentioned model, effective leadership and TQM result in the organisation's "first time philosophy" of doing the right things, right first time as well as improving the competitiveness, effectiveness and flexibility of the whole organisation (Oakland, 2003:30, 35). Business efficiency and effectiveness can only be achieved if

TQM starts at top management and is included in the vision framework dealing with the organisation's guiding philosophy, core values and beliefs as well as the specific purpose of the organisation (Oakland, 2003:31-32).

Oakland (2003:288) continues by stating that it is essential for an organisation to use the team approach in the implementation of TQM due to a greater variety of complex problems which can be addressed by a greater diversity of knowledge, skills and experience and can be solved more efficiently. As teams improve the process of problem-solving and produce results quickly and economically, teamwork throughout any organisation is regarded by Oakland (2003:288) as an essential component of the implementation of TQM. Teamwork builds trust, improves communication and develops interdependence through an environment in which people can grow and use all the resources effectively and efficiently to make continuous improvements. Much academic work on the psychology of teams and on the leadership of teams has been done and Oakland (2003:294) mentions the work of Adair in the development of the action-centred leadership model in which he clearly states that for any group or team a clearly defined task is needed and that the response and achievement of the task are interrelated to the needs of the team and the needs of the individual members of the team. Oakland (2003:302) is further of the opinion that the Myers-Briggs Type Indicator (MBTI) is a powerful aid to team development based on an individual's preferences in giving and receiving "energy", gathering of information, making of decisions, and handling of the outer world.

Oakland (2003:343-344) concludes his argument for TQM by stating that focussing on the customer, understanding the process and seeing that all employees are committed to quality, form the three basic principles of continuous improvement - good performance requires planning (including policies and strategies), processes (including management systems and improvement tools) and people (with the right knowledge, skills and training) supported by uncompromised top level commitment, the right culture and good communication.

In clarifying TQM as a systems approach considering interaction between the various elements of the organisation, Ross (1995:2, 33-35) enlightens the TQM concept through the functions or elements of leadership; information analysis and information technology; strategic quality planning; human resource development and management; process quality; customer focus and satisfaction; benchmarking; organising for TQM through structure and teams; and productivity, quality and re-engineering. All

organisational functions in the life cycle of a product are included, such as design, planning, production, distribution and field service, as well as management functions such as strategy with a customer focus, the tools of quality, and employee involvement. Reinmann (as quoted by Ross, 1995:34) elucidates on the elements of leadership and mentions the characteristics of excellent leadership as visibility, commitment and knowledge ability; a missionary zeal of quality outside the company; aggressive targets for large gains; strong drivers for customer satisfaction and quality improvement; communication of values; and an organisation of flat structures allowing more authority at lower levels and accessibility to customers. Customer satisfaction is stipulated by Ross (1995:1, 61-63) as the goal of TQM which addresses continuous improvement of the quality of goods and services, whilst information is stipulated as the critical enabler of TQM. Technology and information systems serve as keys to quality success as they offer the critical ability to management to make quick decisions.

Benchmarking plays a vital role in TQM programmes and Ross (1995:235) clarifies that the essence of benchmarking is to continuously compare a company's strategy, products and processes with those of world leaders and best-in-class companies in order to learn how they have achieved service excellence. Benchmarking allows organisations to set realistic, rigorous performance targets; it defines gaps in performance; and selects processes to be improved through the provision of training.

Ross (1995:264) regards an organisation as a social system integrating interdependent components such as marketing, production, finance and research in order to achieve an objective. Interdependency and synergism across functions and departments is a precondition in the TQM approach to strategic management. Employee involvement, regarded by Ross (1995:278) as the most critical component of TQM, finds its best form in quality circles where small groups of employees doing similar or related work meet regularly to improve general operations. As quality circles lack the prerequisites of integration with strategy, organisation goals and management systems, a modified form of task teams and self-managing work teams were introduced and are seen as an extension of quality circles where members are empowered to exercise control and optimise the efficiency and effectiveness of the total quality process.

Du Toit et al. (2002:208-209) are of the opinion that the new paradigm of TQM requires a change in approach, from one of accepting a level of deficiency as normal practice to a philosophy of continuous improvement of all processes. TQM is characterised by total involvement and commitment by every employee to improving the quality

processes and investing in knowledge in people to empower them to continuous improvement. Stark (2008) emphasises that continuous improvement of all operations and activities can be regarded as the "heart of TQM". Views on continuous improvement are related further on in the study.

The views on TQM set out in the foregoing indicate the following golden line in approaches that should be incorporated in a service excellence model: customer and supplier relationships; management commitment and excellent leadership; the involvement of everyone in the organisation in a teamwork approach towards quality; continuous process improvement; benchmarking against world leaders; systems thinking; and customer satisfaction.

As TQM is regarded as a systems approach, the next section explores the view of Senge on systems thinking in order to incorporate it in the service excellence model.

2.3.2.2 Senge's view on Systems Thinking

Senge (1990:7, 11) regards business and other human endeavours as systems and believes that his five "component technologies" will provide vital dimensions in building learning organisations. These learning disciplines differ from the more familiar management disciplines in the way that they are more "personal". An organisation cannot be "excellent" as it is always in the state of practising the disciplines of learning and therefore cannot arrive at permanent excellence. The five disciplines are:

- Systems thinking, which serves as the fifth discipline and integrates all the disciplines as described below into a coherent body of theory and practise (Senge, 1990:12). Organisations are overwhelmed by complexity and according to Senge (1990:69) systems thinking is the only way to address complexity which undermines confidence and responsibility. A mind shift is needed from seeing parts to seeing wholes, from seeing people as helpless reactors to seeing them as active participants in creating the future.
- Personal mastery, which according to Senge (1990:141) goes beyond competence and skills, though it is grounded in competence and skills. Senge (1990:139) is of opinion that organisations can learn only through individuals who learn and that personal mastery requires spiritual growth and living a life from a creative viewpoint as apposed to a reactive viewpoint. Inamori (as quoted by Senge, 1990:139) emphasises the role motivation plays to challenge

goals of growth and technological development. The active force in any company is its people with their own will and mind and their way of thinking.

- Mental models are powerful in affecting what a person does and are very active in the sense that they shape how one acts. If the belief is that people are untrustworthy, actions will be differently as when the belief is that they are trustworthy (Senge, 1990:175). New skills and the implementation of institutional innovations that bring these skills into regular practise are necessary to develop an organisation's capacity to work with mental models. Key assumptions about important business issues must be brought to the surface and Senge (1990:186-187) stresses the importance of face-to-face learning skills as well as the integration of these two aspects of mental modelling.
- Building a shared vision is vital for the learning organisation as it provides the focus and energy and synergises individual personal visions through common aspiration. Visions are exhilarating as they create the spark and the excitement that lift an organisation out of the mundane (Senge, 1990:206-208). Personal mastery is regarded by Senge (1990:211) as the bedrock for developing shared visions beyond individuals comfort levels, creating levels of creative tension. A reinforcing process of increasing clarity, enthusiasm, communication and commitment spreads visions and its benefits within the organisation (Senge, 1990:227).
- Team learning as the fourth discipline has, according to Senge (1990:236-237), three critical dimensions. The first need is to think insightfully about complex issues by tapping the potential of many minds to be more intelligent than one mind. The need for innovative, coordinated action, complementing each team member's action, must be built into the relationship whereas the role of team members on other teams is regarded as the third critical dimension. The discipline of team learning involves the mastering of two distinctive ways that teams converse, namely the practises of dialogue and discussion in a creative way.

Senge (1990:266) is of the opinion that the perspective and tools of systems thinking are important in wrestling with enormous complexity of the prime tasks of management teams regarding the development of strategy, shaping of visions, designing policy and organisational structures.

The aforementioned five disciplines need to be taken into account in the environment in which the test and evaluation facilities operate, and in the next section, which deals with continuous process improvements.

2.3.2.3 Views on Business Process Improvement (BPI)/ Re-engineering

According to Harrington (1991:15) the three major objectives to achieve with BPI are: to make processes effective in order to produce the desired results; to make processes efficient by minimising the resources used; and to make processes adaptable to changing customer and business needs. Harrington (1991:5) clearly states that organisations must focus on processes that control customer interfaces in order to improve good *output*, and that the way of thinking, acting and talking must be changed from focussing on organisational structures to focussing on customers. Harrington (1991:34) distinguishes five phases of a BPI model, namely:

- Organising for improvement to ensure success by building leadership, understanding and commitment.
- Understanding all the dimensions of the current business process.
- Streamlining the processes to improve efficiency, effectiveness and adaptability.
- Implementing a measurement and control system in order to control the process for ongoing improvement.
- Implementing a continuous improvement process.

Gerson and Gerson (2006:21) have found the following seven "R" factors that lead to effective and successful performance improvement:

- Establish rapport with the performer in order to have the same improvement goals.
- Respect the performer and communicate your appreciation for his/her efforts.
- Demonstrate the response so that the performer knows what it looks like when it is done correctly.
- Reinforce good performance with verbal feedback and praise.
- Repetition of the appropriate improvement response will lead to performance at a higher level.

- Rhythm to the performance needs to be created as rhythm helps people to improve on whatever they do.
- Rituals performed by people lead to a higher level of achievement due to the repeating nature of a pattern of behaviours ending in successful performance in the past.

Kanji (1994:112) stresses that continually identifying small, incremental improvements should form the basis and reality of continuous improvement. An organisation can improve customer satisfaction by adding together all the many small improvements and using the continuous improvement cycle to fuel the engine of continuous improvement. Besterfield et al. (2003:125-126) are of the opinion that continuous process improvement is designed to "utilise the resources of the organisation to achieve a quality-driven culture" and to strive to achieve perfection. They further state that continuous improvement is made by viewing all work (production and business) as a process; making all processes adaptable, efficient and effective; anticipating the changing needs of customers; controlling in-process performance; eliminating waste and rework; eliminating activities that do not add value to the product or service; eliminating non-conformities in all phases of work; using benchmarking to improve competitive advantage; innovating ideas to achieve breakthroughs; incorporating lessons learned into future activities; and making use of technical tools such as statistical process control, experimental design, benchmarking and quality function deployment in order to assist in continuous improvement.

Ross (1995:316) emphasises that business re-engineering is not re-organising; it means to start from scratch – it is a rejection of the classical concept of labour specialisation and engineering of tasks and a re-invention of the organisation through process redesign. Oakland (2003:198-199) argues that BPR has a top-down approach starting with the discovery of a problem, after which redesigned teams should be established to analyse and document processes in order to clarify the root causes of problems and to innovate and rebuild the new processes.

McLaren (2007:30) regards quality improvement as a race without a finish line and states that the objective of continuous process improvement is to strategically reduce variation in quality by addressing all the causes of variation in order to ensure customer satisfaction.

The next section explores views on how to improve services delivered by organisations in general, in addition to the above-mentioned specific business process improvements or re-engineering.

2.3.2.4 Views on Service Delivery Improvement and Excellence

The White Paper on Transforming Public Service Delivery (SA, 1997) addresses a common objective to align government's effort to render effective services through the need to develop service delivery improvement programmes. According to Van der Waldt (2007:2) such a Service Delivery Improvement Plan (SDIP) should address, amongst other things, the following:

- The existing service delivery levels and the proposed service standards to be adopted.
- How service standards will be monitored and reported on.
- The organisational and systems arrangements.
- Human resource training, supervision and performance appraisal arrangements.
- The way in which the department's communication system will provide information about the type and frequency of services required by customers.
- How the complaints systems will be developed.
- The financial management systems.

Van der Waldt (2007:2-4) is of the opinion that service delivery improvement is a continuous, incremental and progressive process containing the following steps:

- Clear identification of the customer.
- The establishment of customer needs and priorities as the starting point for the setting of standards.
- The establishment of the current service baseline as this is the starting point to decide where and how to make improvements.
- Identify the improvement gap between what customers want and the level and quality of service currently provided.
- Set and progressively raise service standards for closing the improvement gap.
- Gear up for service delivery and introduce monitoring and reporting systems to check on progress and take remedial action when necessary.

- Announce service standards and launch the service delivery programme.
- Monitor delivery against standards and publish the results, as these results will provide valuable insights for future improvement efforts.

Shonhiwa (2001:96-100) introduces the following ten commandments for service excellence: all employees should be adequately service orientated, realising the importance of each customer; the customer comes first at all times; the customer is not dependent on you but you are dependent on the customer; a customer is not an interruption to your work but the cause of it; the customer is not an outsider in your organisation but an important partner; when a customer calls on your services you are not doing him a favour although the opposite is true; customers can go elsewhere if they are not satisfied; the first four minutes of the encounter with a customer are critical and the last two minutes are crucial for a sustainable service relationship; the customer is king and he is the reason for the existence of the business; and foster a relationship of mutual benefit which enables an organisation to profit through service delivery. In addition to these ten commandments, Shonhiwa (2001:101-102) explains his "win/win/win/win" formula for service excellence by stating that the first winners are the customers because they enjoy quality treatment; secondly the service providers win by getting satisfaction from a job well done; thirdly the business wins as customers indulge in repeat-buys of services and mouth-to-ear marketing; and the fourth winner is society, which benefits from the success of an organisation.

According to Fontini (2007:44-45), organisational excellence requires evidence of an integrated leadership system, setting organisational direction through vision; organisational values; the creation of an empowered, agile and innovative climate; the establishment of a culture of legal and ethical behaviour; and the building of future organisational leadership capacity. Sound organisational governance through management and fiscal accountability contributes to organisational excellence, as does the protection of stakeholder interests; the assessment and improvement of the leadership system; social responsibilities; and the monitoring of organisational performance (Fontini, 2007:45).

Oakland (2003:76-77) clarifies that all organisations striving towards service excellence need to update their products, processes and services periodically through invention and design innovation of radically new products and services, as well as through the continuous development and improvement of existing products and services to

enhance their performance and quality, in order to reach the full potential of the system.

Heskett et al. (1997:133) state that quality and value are determined by the customer and not the service provider, and that customer evaluations of quality and value are based on what was delivered and not what was expected in terms of results, process quality and the price. Furthermore, that effective service delivery requires the adaptation of services to individual needs, as customer perceptions of quality and value are relative, and that customer expectations are just as important an element of perceived value as what is actually delivered. Heskett et al. (1997:11) conclude their argument by introducing the service profit chain, adding that there are direct and strong relationships between profits; growth; customer loyalty; customer satisfaction; the value of goods and services delivered; and employee capability, satisfaction, loyalty and productivity.

Arnott and Soobiah (2007:43-45) are of the opinion that it is essential for organisations to achieve high performance as it leads to less dependency on industry conditions and factors that can be an insurmountable barrier in striving towards excellence. The benefits of pursuing high performance are imbedded not only in the day-to-day operational excellence, but also in the development of strong capabilities and the creation of a powerful long-term strategic vision.

In the next section the Six Sigma approach is discussed as part of finding appropriate inputs to the service excellence model.

2.3.2.5 Views on Six Sigma

Bisgaard and De Mast (2006:30) regard the Six Sigma approach as an approach that incorporates a wide variety of ideas that originated from previous quality management viewpoints, except that it focuses on results in monetary and strategic terms and incorporates the learned behaviour that is vital to aligning quality improvement and company profits. Besterfield et al. (2003:150) echo that the Six Sigma approach presents nothing new and focuses on problems after they have occurred.

Oakland (2003:246) mentions the five fundamental phases of the so-called "DMAIC" in the Six Sigma approach to improving performance as: Define - where the scope and goals of the improvement project are defined; Measure – where the current input,

output and process are measured and the short and longer term process capability (the sigma value) is calculated; Analyse – where the gap between the current and desired performance is analysed and benchmarked against recognised standards; Improve – where improvement solutions are generated; and Control – where the improved process is implemented and standards of performance established and measured against through statistical process control. In order to identify and eliminate errors, DMAIC provides a breakthrough strategy and disciplined methods of the utilisation of rigorous data gathered and statistically analysed. Successfully implemented Six Sigma strategies according to Oakland (2003:247) involve the following: leadership involvement and sponsorship; complete organisation training; project selection tools and analysis; improvement methods and tools for implementation; measurement of financial benefits; communication; control; and sustained improvement. A Six Sigma organisation needs to focus on customers' requirements.

As quality improvement entails process and product innovation, Bisgaard and De Mast (2006:33) are of the opinion that systematic innovation is the future way in which organisations can improve their competitive position, better satisfy their clients, and reduce costs. Systematic innovation is broadly defined as an economic concept and includes the development of new products and services; new methods of production or provision; new methods of transportation or service delivery; new business models; new markets; and new forms of organisations. Innovation is viewed by Bisgaard and De Mast (2006:33-34) as a systematically planned and organised activity aiming at a predictable purpose and end results. Tools and roadmaps can be applied to manage the innovation process, to analyse customer needs and expectations and to develop solutions to problems of meeting these expectations. The ultimate quality award is postulated by Bisgaard and De Mast (2006:34-35) as improved bottom line profitability and therefore an economic focus should be applied in innovation initiatives in today's turbulent world of fierce, global competition and rapid change.

Emotional intelligence is postulated by Milivojevich (2006:45) as a useful skill for a project team environment operating within the Six Sigma methodology. He defines emotional intelligence as "the ability to perceive, assess and manage the emotions of one's self and others" and identifies the following eight-step roadmap that addresses emotions scientifically:

- Recognise the symptoms that suggest positive or negative behaviour.
- Define the emotions that create the desired/undesired state.

- Measure the consequences of the emotions.
- Analyse the circumstances and identify the root causes of the emotions.
- Implement and validate solutions that improve the emotional state.
- Monitor and control the circumstances that caused the emotions.
- Standardise and document the methods used to address the circumstances.
- Communicate the lessons learned and integrate them into the coaching cycle.

Through the application of emotional intelligence in the service excellence model, increased team performance will be aimed at by channelling emotions in a positive and effective manner in order to solve potentially debilitating situations facing the test and evaluation facilities.

This concludes the views on and modern approaches to quality improvement in striving for service excellence, which form the basis of the test and evaluation service excellence model. Table 2 depicts a summary of the critical aspects of and modern views on quality improvement and expands on some of the definitions in Table 1.

Table 2: Summary of critical aspects and modern views on quality improvement

Aspects and views	Description
TQM	Customer and supplier relationships; management commitment and excellent leadership; everybody in the organisation's involvement in a teamwork approach towards quality; continuous process improvement; benchmarking against world leaders; systems thinking; and customer satisfaction.
Systems Thinking	Serves as the fifth discipline that integrates the four other disciplines, namely personal mastery; mental models; shared vision; and team learning.
BPI	Five phases: organising for improvement to ensure success by building leadership, understanding and commitment; understanding all the dimensions of the current business process; streamlining the processes to improve efficiency, effectiveness and adaptability; the implementation of a measurement and control system in order to control the process for ongoing improvement; and the implementation of a continuous improvement process.

Aspects and views	Description
Service delivery improvement	All businesses striving towards service excellence need to update their products, processes and services periodically through invention and design innovation with all members of all functions participating in order to reach the full potential of the system.
Six Sigma together with emotional intelligence	Five fundamental phases: Define - where the scope and goals of the improvement project are defined; Measure – where the current input, output and process are measured and the short and longer term process capability (the sigma value) is calculated; Analyse – where the gap between the current and desired performance is analysed and benchmarked against recognised standards; Improve – where improvement solutions are generated; and Control – where the improved process is implemented and standards of performance will be established and measured against through statistical process control. Emotional intelligence is incorporated as another aspect as the ability to perceive, assess and manage the emotions of oneself and of others plays an important part in today's changing environment.

The last part of this chapter focuses on the management of the organisation's performance through the exploration of performance management systems and the techniques that could be used in the service excellence model.

2.4 PERFORMANCE MANAGEMENT SYSTEMS AND MEASUREMENT TECHNIQUES

Performance measurement is the process of assessing progress toward achieving predetermined specific defined organisational objectives, while performance management builds on this process by adding the relevant communication and action on the progress achieved against the goals (Performance Management, 2007). Performance management encounters systems and methods to translate strategic goals into individual performance terms and Du Toit et al. (2002:187) further state that continuous communication between managers and employees is a prerequisite for an

effective performance management system, where performance management focuses on standards and measures to which timescales and priorities are assigned.

Performance information is key to effective management (including planning, budgeting, implementation, monitoring and reporting); it facilitates effective accountability and identifies the scope for improvement; and it focuses the attention on whether public institutions are delivering value for money by comparing their budgets and service delivery plans with actual performance and alerts managers to problem areas where corrective action is required (SA, 2007a:1).

In a quality-driven, never-ending improvement environment, Oakland (2003:103) is of the opinion that quality measurement is needed to ensure that customer requirements have been met; sensible objectives have been set; standards for comparisons have been provided; performance levels have been monitored; quality problems have been highlighted and corrective action has been determined. Further, that the cost of poor quality has been indicated; the use of resources has been justified; and provision was made for feedback on the improvement effort. Oakland (2003:102) stresses his opinion by stating the importance of deciding what to measure, where to measure and how to measure. He regards Deming's cycle of continuous improvement – Plan-Do-Check-Act – as a useful design aid for the measurement system. All critical parts of the system should be measured. However, the value of any measurement must be compared with the cost of producing it. The importance of benchmarking against industry leaders or tough competitors is debated by Oakland (2003:149). He indicates that benchmarking measures an organisation's operations, products and services against those of its competitors in order to continuously identify, understand and adapt best practices and processes that will lead to superior performance.

Weintraub (1993:39) states that a well-designed measurement system indicates what is being measured, for what reason, and to what extent it satisfies the needs of the customers. A performance measurement system is regarded by Flanagan and Finger (1998:317) as a criterion of TQM. Competition urges organisations to match or improve on the performance of the nations or the world's best, and this benchmarking is an essential tool for achieving top performance. A well-implemented performance measurement system should focus on strategy and vision and not on day-to-day operational controls, and allows a consistent language to be used within an organisation (Performance Measurement, 2008).

National Treasury (SA, 2007a:1) argues that the most valuable reason for measuring performance is "that what gets measured gets done" and that performance information allows management to pursue results-based management approaches such as performance contracts, risk management and benchmarking.

2.4.1 Techniques used in Performance Measurement

It is important when modern quality techniques are applied correctly in organisations, that all aspects of quality – customer satisfaction, fewer defects, cycle time, productivity and total cost – must improve. If one of these aspects does not improve, stability and no decline in that aspect is at least required (Quality, 2008).

Oakland (2003:227) elucidates that knowledge of a basic kit of techniques in a systematic approach to improve processes is the answer to continuous improvement. The following techniques are mentioned by Oakland (2003:227-234):

- Process flowcharting to record the series of events and activities, stages and decisions, in an understandable form that can be communicated to all.
- Check sheets to gather data.
- Histograms to indicate in a graphical way the frequency with which values or activities occur.
- Scatter diagrams to reveal whether or not a strong or weak, positive or negative correlation between parameters exists.
- Stratification to divide a set of data into meaningful groups.
- Pareto-analysis to outline the causes and the percentage of defective output (also known as the 80:20 principle).
- Brainstorming to generate a large number of ideas in a short period to be used in a variety of situations.
- Ishikawa or fishbone diagram to establish the causes and the effects on quality deviations.
- The Cause and Effect Diagram with Addition of Cards (CEDAC) does not only quantify the description of the problem but continually updates the results on the progress to achieving it.
- The Nominal Group Technique (NGT) prevents domination by particular individuals in a team brainstorming exercise where team consensus is achieved by the facilitator.

- Force field analyses identify the forces that either obstruct or help a change that has to be made.
- The emphasis curve ranks factors that cannot be readily quantified in terms of cost and frequency of occurrence in priority order by comparing only two factors at any one time.
- Control charts as a form of a traffic signal can be used as a sensitive diagnostic tool to prevent errors or defective output being produced.
- Affinity diagram to gather large amounts of language data.
- The inter-relationship diagraph to take a central idea or problem and map out the logical or sequential links among related factors.
- The systems flow/tree diagram to systematically map out all the activities that must be accomplished to reach the desired goal.
- The matrix diagram to outline the interrelationship and correlations between tasks, functions or characteristics, as well as their relative importance.
- Matrix data analyses show the relationship between variables in a matrix diagram.
- Process decision programme chart to map out each event and contingency that might occur when progressing from a problem statement to its solution.
- The arrow diagram to schedule tasks.

Besterfield et al. (2003:461) are of opinion that Statistical Process Control (SPC) is one of the best tools for improving product and service quality as it not only controls the process but has the capability to improve it as well. The first four techniques of the seven basics techniques of SPC, namely the Pareto diagram, the process flow diagram, the cause-and-effect diagram and the check sheets, are not regarded by Besterfield et al. (2003:461) as statistical but as acknowledging the statistical fundamentals of SPC in the histograms, control charts and scatter diagrams.

Oakland (2003:236) regards SPC as a tool to reduce variability which causes the most *quality* problems, and as TQM requires that processes should be improved continually by reducing variability and to be more consistent and on target with jobs done, SPC forms a vital part of the TQM strategy. The techniques of SPC will assist people to know whether the process is meeting the requirements at any point and time, and will help to make corrective adjustments to the process when necessary as regards problems in products, times of delivery, ways of doing things, materials, employees' attitudes and maintenance practices, to mention but a few. The possibility exists to

analyse products, services and processes to determine possible modes of failure and their effects on the performance of the system, and Oakland (2003:90-91) describes Failure Mode, Effect and Criticality Analysis (FMECA) as the study of potential failures to determine their effects ranked in the order of seriousness. As the primary objective of FMECA is to determine the features of product design, production or operation that are critical to failure in order to reduce failure, FMECA should be applied at the design stage of a product or service.

The above-mentioned techniques used in performance measurement assist in the development and implementation of performance management systems, which are discussed in the next section.

2.4.2 Performance Management Systems

It is important that performance information captured in the performance management system clearly demonstrates how entities use available resources to deliver on their mandate. Indicators should be developed to measure economy - determining whether specific inputs are acquired at the lowest cost and right time; efficiency - determining how productively inputs are translated into outputs; effectiveness - determining to which extent the outputs achieve the desired outcomes; and equity – determining whether services are being provided impartially, fairly and equitably (SA, 2007a:6-9).

There are several performance measurement systems in use, each with their own group of supporters. Examples of these systems are the Balanced Scorecard (Kaplan and Nortan), Performance Prism (Neely), Cambridge Performance Measurement Process (Neely) and the Total Measurement Development Method (Tarkenton Productivity Group), to mention but a few (Performance Measurement, 2008). The Balanced Scorecard and the South African Excellence Model will be studied in order to create a unique service excellence model for the military test and evaluation facilities.

Performance management remains key in managing organisations and Mosala (2007:32) emphasises this by adding that effective leaders recognise the critical role of performance management. Oakland (2003:125) is of the opinion that a good measurement system starts with the customer and measures the right things at the right cost, relating all critical parts of process performance to the needs of the customer. Participation in the development of measurement criteria by all employees enhances their understanding and acceptance of the measurement system. The

following steps are regarded by Oakland (2003:126-127) as the introduction of a performance management system:

- Identify the purpose of conduction measurement, either for reporting, controlling and/or improvement efforts.
- Find the balance between individual measures and group measures reflecting process performance.
- Measure all the key elements of performance (time, cost and product quality).
- Ensure that the measures of client satisfaction include the input from internal/external clients.
- Establish standards of performance through the selection of the right measures.
- Provide training on the measurement system.
- Ensure full participation of the system.
- Select measures that have a high leverage on the cost/benefit analysis.
- Introduce the management system as widely as possible, as effective decision-making will be based on measures from all areas of operations.
- Surrogate measures should be used for subjective areas where quantification is difficult.
- Changes in strategic direction and continual review should be addressed in a flexible measurement system.
- Ensure that the measures reflect the quality drive through small incremental achievements that match the continuous improvement approach.

Oakland (2003:127) concludes by stating that "the measurement system must be designed, planned and implemented to reflect customer requirements, give visibility to the processes and the progress made, communicate the total quality effort and engage the never-ending improvement cycle". Throughout the implementation of a performance management system the focus has to be on critical goals that can bring visible progress and enhancement (Performance Measurement, 2008).

Gerson and Gerson (2006:111, 116) stress that meaningful and quantifiable measures need to be established which are meaningful not only to the organisation but also to the performer, adding that it is essential that individual goals align with organisational goals. The measurement and evaluation scoreboard not only refers to financial results but includes the establishment of measurable outcomes of everyone's performance and the impact thereof on the performance of the organisation. Performance

appraisals measure each employee's contribution to meeting the needs and goals of the organisation. By using an effective performance appraisal system, an organisation can improve its competitive status by increasing productivity and decreasing non-productive behaviour (Wilson, 2001a:77).

Constructive and positive feedback is essential for performance improvement, and the importance of rewarding the outcome instead of reinforcing the performance effort is clearly stated by Gerson and Gerson (2006:114). Wilson (2001a:77) indicates that performance appraisals are used to provide positive and negative feedback to the employees and to assist them to set new goals based on past performance. Performance rewards, such as recognition, gifts, bonuses, merit increases, compensation and opportunities for promotions, contribute to the motivation of employees to improve their performance. Demotions, transfers and terminations also originate from records of performance appraisals which serve as a rationale for past decisions. Wilson (2001a:78) concludes by highlighting the importance of performance appraisals for staff development, career planning and human resource planning.

Effective management of performance information should clearly indicate the different responsibilities, structures and systems involved in managing performance. Performance management systems should be integrated within existing management processes and systems whilst using appropriate capacity to manage and evaluate the performance information at the end of a service delivery period (SA, 2007a:13-14).

In the next two sections the South African Excellence Model (SAEM) and the Balanced Scorecard (BSC) are discussed and evaluated against the above-mentioned criteria.

2.4.2.1 The South African Excellence Model (SAEM)

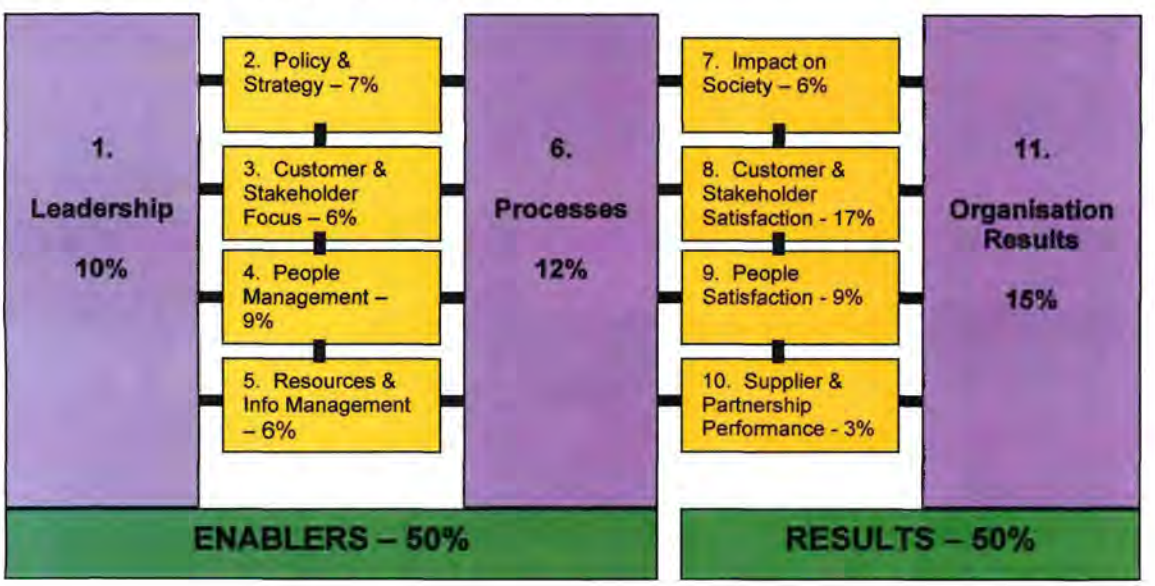
The SAEM is a management tool for improving the efficiency and effectiveness of service delivery. The South African Excellence Foundation (SAEF) was established in 1997 with a view to developing a South African National Excellence Model and Award based on the Baldridge National Quality Award (SAEF, 2000:9). According to Besterfield et al. (2003:191), the Baldridge criteria for performance excellence form the basis for making awards and for giving feedback to applicants, and are directed towards results in seven areas of business performance: customer satisfaction/ retention; product and service quality; market share, new market and development; productivity, operational effectiveness, and responsiveness; human resource

performance/development; supplier performance/development; and public responsibility/corporate citizenship.

The self-assessment process of the SAEM provides an organisation with the means to focus and prioritise its efforts to achieve service excellence through effective continuous quality improvement and to enhance the service excellence culture (SAEF, 2000:2). Self-assessment is described as "a comprehensive, systematic and regular review of an organisation's activities and results referenced against a model of performance excellence" (SAEF, 2000:11). The dynamics of the excellence model can be described in two categories, namely enablers and results. The leading indicators, or the enabler criteria, indicate what is done by an organisation and how it operates. The lagging indicators, or the results criteria, indicate what has been achieved and how measurement and target achievement are arranged (SAEF, 2000:15-16).

Diagram 2 illustrates the framework of the excellence model for the public service and indicates the weightings of the criteria (SAEF, 2000:14).

Diagram 2: Excellence Model Framework



Source: Adapted from SAEF (2000:14).

The criteria as mentioned in the SAEM are described in Table 3 (SAEF, 2000:18).

Table 3: Description of criteria for the Excellence Model Framework

	Criteria	Description
1.	Leadership	Describes the behaviour and example set by all people that are responsible for leading and inspiring others in the organisation, supporting and promoting a culture of performance excellence. It measures how leaders provide appropriate resources and assistance and how they are involved with customers, partners and supplier chains. The way in which leaders recognise and appreciate people's efforts and achievements, and how they address public responsibilities, are also measured.
2.	Policy and Strategy	Indicates how an organisation develops, formulates, communicates, implements, reviews, improves and translates policy and strategy into plans and actions.
3.	Customer and Stakeholder Focus	Indicates how an organisation determines the needs, requirements and expectations of customers. It focuses on how market accessibility is maintained, enhances relationships, how complaints are managed, and determines the satisfaction level of customers and stakeholders.
4.	People Management	Indicates how an organisation releases the full potential of its people by how people resources are planned and improved, how people capabilities are sustained and developed, how people agree to targets and continuously review performance, and how people are involved, enabled, empowered and recognised.
5.	Resources and Information Management	Indicates how an organisation manages and maximises the use of resources and information effectively and efficiently. It focuses on how financial and information resources are managed, as well as how comparative information and data are selected and used. Emphasis is also placed on how partnering and supplier relationships, buildings, equipment, assets, technology and intellectual property are managed.

	Criteria	Description
6.	Processes	Indicates how an organisation identifies, systematically manages, reviews and improves the processes by which it operates. Innovation and creativity play an important role in the changed processes in order to reach benefits throughout the organisation.
7.	Impact on Society	Indicates what an organisation is achieving in terms of the needs and expectations of the local, national and international community at large, including quality of life through education, conservation of global resources and environmental management issues.
8.	Customer Satisfaction	Indicates the level of customer satisfaction an organisation is achieving by its products, services and customer relationships, including the number of complaints and the number of new or lost clients.
9.	People Satisfaction	An indication of what the organisation is achieving in relation to the satisfaction of the people in the organisation.
10.	Supplier and Partnership Performance	Indicates what an organisation is achieving in relation to the management of its partners' and suppliers' processes, including the level of involvement of partners and suppliers in continuous improvement in product and service quality, cost reduction, innovation and the enhancement of knowledge.
11.	Business Results	Indicates what an organisation is achieving in relation to its overall planned business objectives and in satisfying the needs and expectations of each stakeholder, either with financial and non-financial interest.

The scope of the results and improvement targets play a vital role in the success of the assessment of these criteria. The measurement of the right things and the comparison with other organisations will indicate if the results of an organisation are showing positive trends. A prerequisite for the successful adoption of the SAEM is that it should be communicated and explained to all levels in an organisation, and is usually performed at an independent unit level before it is implemented at corporate level (SAEF, 2000:11-12).

The SAEM, as a self-assessment scoring tool, can be used as a tool that can provide a comprehensive, internationally recognised framework that can assist an organisation in identifying and prioritising opportunities for continuous improvement. Self-assessment is a powerful diagnostic tool, identifying an organisation's strengths and focussing on all efforts to achieve better results and to assist an organisation in identifying "best practice". It is a means to educate people in the organisation on how to apply the principles and practices of performance excellence and to integrate various quality and excellence initiatives into normal business operations (SAEF, 2000:11).

2.4.2.2 The Balanced Scorecard (BSC)

The BSC concept was introduced in 1992 by Robert Kaplan and David Norton. They realised that an exclusive reliance on financial measures was insufficient in a management system and that it should be supplemented by other measures that form the drivers or lead indicators in an organisation. Financial measures were seen as lag indicators reporting on the outcomes from past actions and the value of the BSC is in the linkage of measurement to strategy where non-financial measures were transformed from an operational checklist to a comprehensive system for strategy implementation (Kaplan & Norton, 2001:87). Mosala (2007:32-33) adds to this and points out that the operational measures become the drivers of future financial performance in which improvement in non-financial measures will have a positive impact on future financial results.

Duvel and Rumbel (1998:38) are of the opinion that the BSC acknowledges the vital role of performance contracting and performance measurement to ensure transformation, and it provides a framework for organisations to manage strategy implementation. The BSC allows strategy to evolve in reaction to technology changes and changes in the competitive environment, using financial and non-financial indicators.

According to Epstein and Manzoni (1998:193) the BSC concept originated from the realisation that no single indicator can capture the total picture and complexity of an organisation's performance. Financial indicators that are regarded as "lagging indicators of performance" record the effect of decisions, not when the decisions are made but after the impact of materialisation, which tend to be less proactive indicators of potential problems than non-financial indicators. The aim of the BSC is to identify

actionable performance indicators and to align these indicators with the organisation's overall vision and strategy (Epstein & Manzoni, 1998:194).

According to Kaplan and Norton (2001:90) the BSC provides a framework for organising strategic objectives into the four perspectives that are unique to this approach. The concepts and criteria of the different perspectives are described in Table 4 below.

Table 4: Concepts and criteria of Balanced Scorecard (BSC) perspectives

	Perspective	Concepts and criteria
1.	Financial	Focuses on the shareholders' interests to assure sufficient return on investment and the creation of shareholders value (Epstein & Manzoni, 1998:194). The strategy and objectives for growth, profitability and productivity to enhance shareholder value are included in this perspective. Companies increase economic value through revenue growth and productivity. Revenue growth is increased by new markets, new products, new customers and the increase in sales to existing customers by deepening relationships with them. Higher productivity can be achieved through lowering direct and indirect expenses and utilising assets more efficiently (Kaplan & Norton, 2001:90-93).
2.	Customer	According to Duvel and Rumbel (1998:39) there are four criteria that influence the customers' perception of an organisation: time in which development and delivery take place, the quality of products and services, the value-added services an organisation supplies, and the total cost of offering a product or service. Epstein and Manzoni (1998:194) argue that an organisation can "delight customers all the way into bankruptcy" if it does not perform well on key internal dimensions. Creation of value to customers' needs to transform into shareholder value through effective and efficient key internal processes.

	Perspective	Concepts and criteria
3.	Internal process	Operational excellence should be achieved by improving supply-chain management, asset utilisation, resource-capacity management and all other internal processes. Innovative ideas are important to develop new products and services, and effective relationships with external stakeholders are a necessity for operational excellence (Kaplan & Norton, 2001:93). Duvel and Rumbel (1998:39) indicate that the internal process perspective derives from the business processes that have the biggest impact on customer satisfaction. Market leadership is obtained by applying best practices and critical technologies. Performance measurement influences employee action directly and links operational best practises with total business strategies.
4.	Learning and growth	Kaplan and Norton (2001:94) regard learning and growth as the foundation of any strategy. Managers should define employee capabilities and skills and align human resources and information technology with the strategic requirements from its critical internal business processes, customer relationships and differentiated value proposition. According to Duvel and Rumbel (1998:39), this perspective takes cognisance of changing targets that require continuous improvement in competitiveness. The investment in employees is measured to ensure the improvement in skills that lead to improved operating efficiencies and improved customer satisfaction.

It is important to link all the perspectives and interaction between all the necessary measurements in order to achieve the advantages of the BSC. The methodology demands that management teams understand their business strategies, product and service strategies, financial plans, budgets, strategic plans and transformation programmes (Duvel & Rumbel 1998:39).

Butler et al. (1997:244) are of the opinion that the BSC is more than a performance measurement technique and that it can be regarded as a management system which puts strategy and vision at the centre. The BSC serves as a powerful motivator to employees to perform to the best of their ability in order to arrive at goals without a control bias.

According to Epstein and Manzoni (1998:195) an obvious advantage of the BSC is that it indicates in one document four different perspectives on the organisation's performance. The BSC groups a small set of selected indicators to provide a more "balanced" view of the organisation's performance and highlights the trade-offs between the different measures.

The BSC presents an opportunity for organisations to align their measurement systems with their strategies, while focussing on growth opportunities rather than on individual, short-term gains. Attention is drawn to the creation of long-term economic and organisational benefits (Duvel & Rumbel, 1998:39).

An organisation can communicate and reinforce its strategy to its employees by means of the BSC. It reinforces traditional ways of communication by translating the strategy into quantifiable indicators which create a form of interactive control and involve attention from operating managers. Discussions challenge and debate action plans and assumptions which force the BSC to be an interactive document that will align the organisation to greater competitiveness (Epstein & Manzoni, 1998:196-197).

For a BSC to be effective, the performance indicators must link with the vision and strategy of the organisation. The selection process should be a conscious and deductive effort to create a measurement tool that will focus on the objectives to be achieved and the critical way of getting there (Epstein & Manzoni, 1998:193-194). Mosala (2007:35-36) highlights the effectiveness of the BSC by identifying several shortcomings, namely not setting the right performance targets or setting them vaguely, measuring incorrectly, too task-orientated resulting in a "ticking" process, and lastly the different objectives not being in support of each other.

Although the BSC is very popular amongst users there is no single version of the model that has been universally accepted by organisations, and the diversity and unique requirements create a situation where the "no one-size-fits-all approach" will ever do the job (Performance Measurement, 2008).

Similarities and differences between the SAEM and BSC need to be clarified and tested against theoretical aspects as described above, as well as against the requirements of the test and evaluation facilities' management teams in order to develop a unique performance management system as part of the integrated service excellence model.

Similarities and differences between the two systems can be viewed in Table 5.

Table 5: Similarities and differences between the South African Excellence Model (SAEM) and the Balanced Scorecard (BSC)

Similarities	Differences
Management tools to improve the efficiency and effectiveness of service delivery.	SAEM is directed towards seven areas of business performance, whilst BSC provides a framework for four perspectives of strategic objectives on organisational performance.
Aimed to achieve service excellence through effective continuous improvement.	SAEM focuses on leading indicators indicating what is done by an organisation and how it operates, as well as on lagging indicators indicating the results which have been achieved. BSC measures the results in four perspectives against strategic goals.
Focus not only on financial results and improvements, but also on customer and stakeholder satisfaction as well as people management through learning and growth. Process improvement receives high priority in both approaches.	Self-assessment of the SAEM offers a powerful diagnostic tool to benchmark efforts and results against other organisations or best practice. The BSC has no single version that fits all organisations, which makes comparison with other organisations or best practice impossible – the BSC measures only the in-house performance.
Weightings of criteria play an important role in both approaches to complete a balancing act in performance management.	SAEM focuses on business unit or corporate level, whilst BSC focuses on employee levels' performance adding to corporate level's achievement.

In developing a performance measurement system as part of the service excellence model, a balance is needed between performance, value and personal willingness to dedicate an organisation to performance excellence. Elliot (2006:21) emphasises this by stating that "it is a matter of living by the ethos of a value system" that will create this balance between employees, communities, suppliers, stockholders and managers.

2.5 CONCLUSION

Work done by quality theorists on quality management models and approaches contributing to the development of an integrated service excellence model for strategic military test and evaluation facilities were explored in this chapter. In order to understand modern approaches to service excellence, the antecedents' contributions formed the basis of the research, followed by modern approaches to quality improvement.

Playing a critical part in service excellence, a performance management system needs to be implemented in an organisation striving towards service excellence, and the aim in this chapter was to explore certain performance measurement techniques, criteria and systems in order to develop the best possible model to achieve service excellence in a specific environment. Advantages and strong points of the various models explored in this chapter will be tested against the views of the management teams of the various test and evaluation facilities, before being integrated into this unique model.

As this model needs to address service delivery in a public and corporate governance environment, challenges on financial matters, human resource issues, environmental issues as well as testing challenges are investigated in the next chapter.

CHAPTER 3
CHALLENGES IN OBTAINING SERVICE EXCELLENCE

3.1 INTRODUCTION

The management models, tools and approaches to improve quality which are to be incorporated in a service excellence model were discussed in chapter 2, including aspects and advantages of various models and approaches as highlighted by the antecedents of quality management and modern views on quality approaches or systems. The integrated service excellence model developed by the researcher needs to steer the test and evaluation facilities towards service excellence and needs to address the challenges facing these facilities in obtaining service excellence within the boundaries of public and corporate governance.

Chapter 3 reflects on the challenges these facilities will experience, and focuses on financial challenges, human resource challenges, environmental challenges as well as accreditation standards to be obtained in test and evaluation services. Applicable Acts and requirements within the public and corporate governance sphere are explored in order to align the service excellence model with the provision of service excellence.

The aim of this chapter is to gain relevant information on the challenges facing the test and evaluation facilities so that the solutions to these challenges are built into the service excellence model in order to enhance the service delivery process.

3.2 CONCEPTUALISING KEY CONCEPTS

In order to understand key concepts and Acts referred to in this chapter, it is necessary to clarify the origin and meaning of relevant Acts and expressions, such as public and corporate governance, resource management including the Public Finance Management Act 1 of 1999 as amended (PFMA), employment equity, Broad-Based Black Economic Empowerment (BBBEE), Safety, Health and Environmental (SHE) management as well as testing specifications and standards.

3.2.1 Public and Corporate Governance

Deloitte (2008) states that "government exists to serve the needs of the public" whilst "governance exists to ensure those needs are served efficiently, effectively and fairly" – public and corporate governance accomplishes this goal by providing clear processes and structures on decision-making, strategic alignment, managerial control, supervision and accountability. The Organisation for Economic Co-operation and Development (OECD) is of the opinion that good and effective public governance strengthens democracy and human rights, promotes economic prosperity and social cohesion, reduces poverty, and enhances the protection and sustainability of environmental resources as well as the creation of confidence in government and public administration (OECD, 2008).

Corporate governance deals with the "ABC" and fundamentals of sound corporate business practices, including accountability, sustainability and transparency of business management, and is defined as "the system by which corporations are directed and controlled". It ensures control over strategy, communication and operations in achieving corporate objectives (Corporate Governance, 2008). O'Donovan (2008) adds to the above definition and defines corporate governance as "an internal system encompassing policies, processes and people, which serves the needs of shareholders and other stakeholders, by directing and controlling management activities with good business savvy, objectivity and integrity. Sound corporate governance is reliant on external marketplace commitment and legislation, plus a healthy board culture which safeguards policies and processes".

The test and evaluation facilities have to engage in sound public governance and corporate business practices in order to adhere to the above governance explanations of accountability, economic prosperity, protection and sustainability of environmental resources, transparency of business management as well as the creation of confidence in government and public administration.

3.2.2 Resource Management

Resource management is a key business process and common feature in all organisations, and this study focuses on financial management, procurement of production/services resources and human resource management. Resource management is defined as "the efficient and effective deployment of an organisation's

resources when they are needed" - resource management plays a vital role in activity resource estimation of financial resources, human resources and production resources, which contributes to the successful completion of projects (Resource Management, 2008). Resources firstly have to be planned, then acquired, deployed, maintained, and eventually disposed of. These resources need to continually improve the effectiveness of the management system through the implementation of change in the organisation's processes (Hoyle, 2006:305-307). Hoyle (2006:308) further explains that the determination and control of the resources to meet the client's needs is a fundamental requirement and fundamental in achieving all other requirements.

Financial accountability is legislated in the PFMA, which introduced generally recognised accounting practices and uniform treasury norms and standards, prescribing measures to ensure transparency and expenditure control in all spheres of government (SA, 1999:1). Public entities must submit all information required by the National Treasury in terms of sections 47 and 76(4) of the Act to the Registrar of Public Entities in the National Treasury (SA, 2006:78).

In the procurement of production resources, BBBEE plays a vital role. South Africa's policy of BBBEE is a pragmatic growth strategy aimed at realising the country's full economic potential and targeting inequality, which is regarded as the South African economy's weakest point. The strategy stresses a Black Economic Empowerment (BEE) process that concentrates on growth and development and not merely on the redistribution of existing wealth (Black Economic Empowerment, 2008). The initial BEE was broaden by focussing not only on ownership but also on other components of the so-called balanced scorecard. The BBBEE is defined as the economic empowerment of all South African Black people, including women, workers, youth, people with disabilities and people living in rural areas, through diverse but integrated socio-economic strategies. These strategies include the following: increasing the number of Black people that manage, own and control enterprises; facilitating ownership and management of enterprises; human resources and skills development; achieving equitable representation at all levels in the workforce; preferential procurement; and investment in enterprises owned and managed by Black people (Magwaza, 2008:5-6).

The human resource function is recognised by Saunders (2006:44) as a strategic value elevated to a strategic partnership level. It includes management, people, performance and development. Human resource management focuses on challenges in the identification of the best possible candidates for the job, outcomes-based learning and

competency based assessment within the sphere of employment equity. Employment equity promotes equal opportunity and fair treatment in employment through the elimination of unfair discrimination and the implementation of affirmative action measures to redress the effects of discrimination – the goal of employment equity is to create a diverse workforce that is representative of the people of South Africa as well as to promote economic development and efficiency in the workforce (SA, 1998:5).

For the purpose of this study resource management deals with the effective and efficient deployment of the test and evaluation facilities' financial resources, procurement resources and human resources.

3.2.3 Safety, Health and Environmental (SHE) Management

Human capital is defined as "the health, strength, talents, education and skills that humans can use to produce goods and services" (Von Moltke, 2008b:26). This capital is managed through the Occupational Health and Safety (OHS) management system embedded in the OHSAS 18001 Standard as well as environmental management embedded in the ISO 14001 Standard (SHE Management Systems, 2008).

Safety, health and environmental protection are perceived as concrete opportunities for value creation and strengthening the confidence of all role-players, stakeholders and the public at large (Lonza, 2008). An organisation has to implement the elements of a compliance assurance programme in order to fulfil its regulatory obligations. These critical elements need to be imbedded in the commitments and goals of the organisation, as well as in the supporting processes and evaluation of performance at all levels in the organisation. According to Briggs (2005:80), the applicable ISO standards will enable organisations to address the safety, health and environmental status and issues.

The test and evaluation facilities must ensure that they conduct their activities in a responsible manner and that they are committed to their human capital's safety, health and sustainable development.

3.2.4 Testing Specifications and Standards

Consumers have the same desire, namely to obtain the most efficient, effective, safe and reliable goods and services at the best prices. This value-for-money interest is safeguarded by the need for standardisation and testing against specifications. In dealing with this desire, the SANDF, Armscor and the South African Bureau of Standards (SABS) develop the so-called "RSA Military Standards" within the defence industry in order to cater for unique requirements for standards with a military purpose that do not exist elsewhere (Armscor, 2008a). A "RSA Military Standard" is a generic term representing different types of documents, e.g. specifications, standards, handbooks, etc. which are used by the RSA military community (Armscor, 2008a). The test and evaluation facilities exercise their services against these military standards as well as the International Organisation of Standardisation (ISO) standards as defined in the next paragraph.

In the adoption of ISO standards the test and evaluation facilities embark on the basics of a good quality system recognised internationally. The precise guidelines of ISO provide long-term economic benefits for organisations that choose to implement those standards that are applicable (ISO Standards, 2008). The two applicable standards for the facilities are the ISO 9001:2000 and ISO 17025:2005, which serve as a general quality management system and a quality management system for testing laboratories respectively.

In elaboration of the environment in which these facilities operate, the principles and objectives of good governance which the facilities aim to achieve will be discussed in the next section.

3.3 GOVERNANCE PRINCIPLES

The United Nations outlined the characteristics of good governance as anti-corruption, where authority and its institutions are accountable, effective, efficient, participatory, transparent, responsive, consensus-orientated and equitable. This view was supported by the World Leaders at the 2005 World Summit where they concluded that good governance is integral to economic growth, the eradication of poverty and hunger, as well as sustainable development (Good Governance, 2009).

Corporate governance is a multi-faceted subject impacting on economic efficiency and the shareholder's welfare, including a set of processes, customs, policies, laws and institutions affecting the way an organisation is directed, administered and controlled (Corporate Governance, 2008). Koekemoer (2007:61) states that corporate governance includes the relationships among principal players, i.e. the shareholders, management and the board of directors, as well as other stakeholders, namely the employees, suppliers, customers, banks and other lenders, regulators, the environment and the community at large. King (2006:4) explains that the practice of good governance is a journey and not a destination, and whilst governance is a dynamic activity, it can be regarded as a continuous learning process.

Governance is viewed by Hendrikse and Hendrikse (2004:97-101) as the control mechanism for preventing the risk of mismanagement from conflicting priorities, conflicts of interests, misallocation of resources, misaligned incentives and other manifestations of human weaknesses associated with excessive power. They further state that "good governance is the foundation of good business" and regard corporate and business governance as a partnership of shareholders, directors and management providing a framework for the creation of wealth and superior performance towards the wider community of stakeholders and the society. The purpose of "good governance" is to match an organisation's vision, mission, objectives and intensions with management conduct and behaviour. Van der Waldt et al. (2002:246-247) explain that in the context of an institution's vision, political officials and managers need to create challenging visions of what is possible in the future within the boundaries of the guiding principles of public administration and management. This vision should be enlightened by the mission of the institution in which specific and measurable goals are qualified, followed by institutional objectives. Fox and Meyer (as quoted by Van der Waldt et al., 2002:248) define an objective as "a short-term goal that can be deduced from an organisation's mission statement" and further state that it forms the basis of performance evaluation.

Corporate governance reform in South Africa was established in 1994 with the first King Report on Corporate Governance and followed up in 2002 with the second King Report providing comprehensive guidance in the conduct of boards and directors, defining new parameters in risk management and internal control assurance as well as attendant issues regarding corporate citizenship and responsibility (IOD, 2005:310-311). The King 2 Code of Corporate Practices and Conduct states that governance principles apply to legal entities such as companies, closed corporations, public entities

as well as non-profit-making organisations and relate to the way a business is directed and governed dealing with strategies, policies and procedures that have a direct impact on organisational performance (Hendrikse & Hendrikse, 2004:100-101).

According to Mallin (2004:195-197), the King 2 Code of Corporate Practices and Conduct contains principles in the following areas:

- Boards and directors, where best practice, the responsibilities of the directors and director remuneration are covered. The board should preferably comprise a majority of non-executive directors that are independent in order to enable the protection of shareholder and minority interests.
- Risk management, where the board has responsibility for the overall risk management process and has to identify where the business may be vulnerable.
- Internal audit function, with a reporting line directly to the Chief Executive Officer (CEO) and liaison with the external auditors.
- Integrated sustainability reporting on the nature and extent of an organisation's social, transformation, ethical, safety, health and environmental management policies and practices, as well as compliance with its code of ethics.
- Accounting and auditing, where an audit committee should be established that has to disclose in the annual report whether the committee adopted formal terms of reference and whether these have been complied with.
- Relations with shareholders, in order to ensure that adequate information is provided to all shareholders in a reasonable time for discussion purposes.
- A balanced view of an organisation's position on non-financial as well as financial matters should be communicated to all the stakeholders.

In addition to the above, Mallin (2004:195) points out that seven characteristics of good corporate governance: discipline, transparency, independence, accountability, responsibility, fairness and social responsibility, are identified by the King 2 Report. The protocol for state-owned enterprises on corporate governance, which forms the basis of corporate governance standards at all levels of public sector institutions and agencies and updated in the King 2 Report, supplements the requirements of the PFMA and the National Treasury Regulations (IOD, 2005:314).

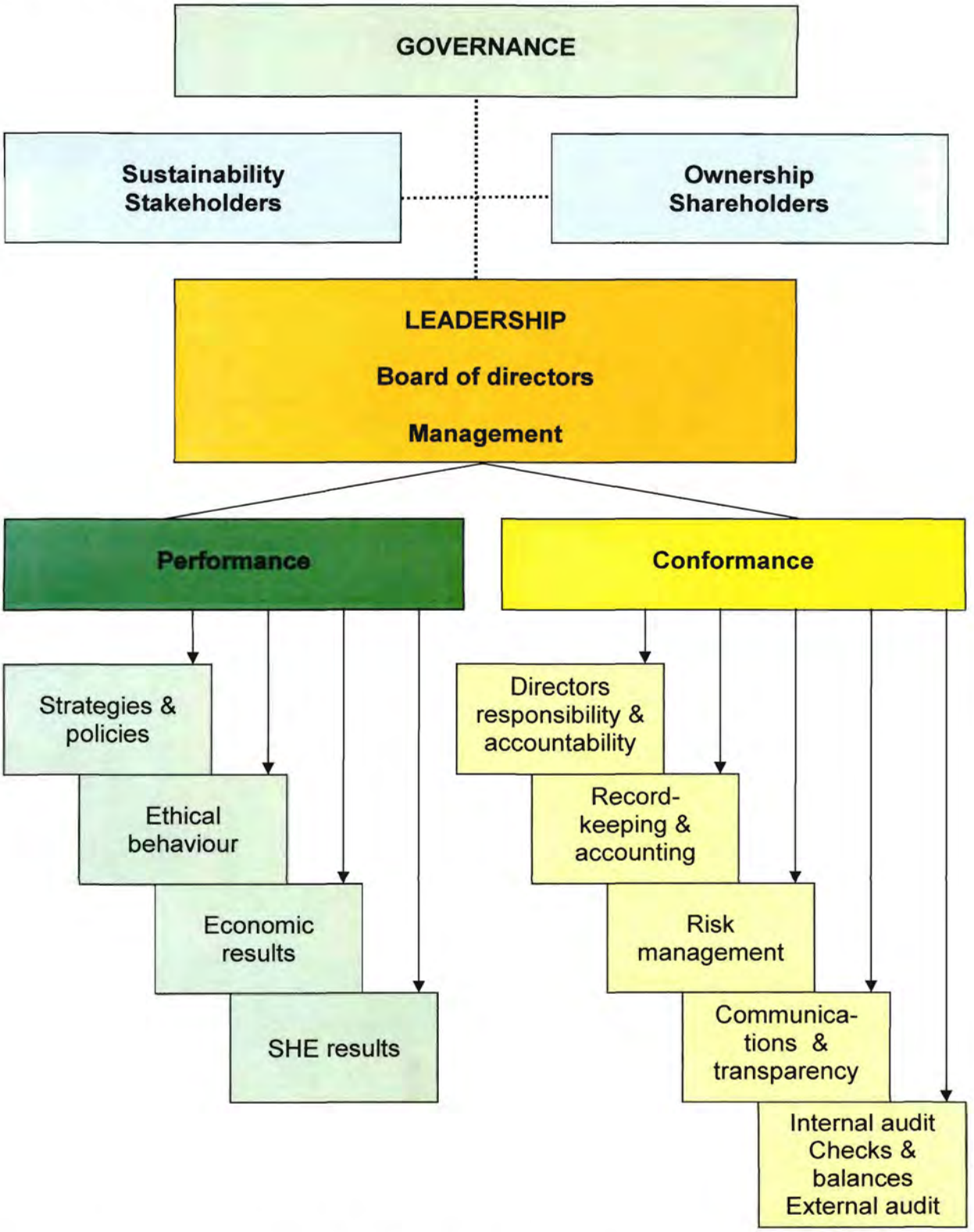
Deloitte (2008) is of the opinion that inadequate controls are the leading source of governance problems, and that rigorous processes and controls are needed to align actions with the organisation's strategic goals. As government is entrusted with public funds and resources, ethical standards such as honesty, integrity, propriety and objectivity need to be secured through a combination of individual professionalism, personal standards and a rigorous control framework. Deloitte (2008) mentions the following strategies in order to achieve success in governance: be transparent for critical activities and decisions; promote impartial decision-making through conflict of interest policies; use performance contracts to define success in the measurement of results relative to strategic goals; establish a clear relationship between activities and outcomes; and embrace performance measurement and accrual accounting where the focus is on outcomes and results and not just on budgets and spending.

Hendrikse and Hendrikse (2004:106-107) view the following as objectives of governance and regard it as a catalyst for improved compliance that leads to improved performance:

- Balance the interests of shareholders (wealth creation), business stakeholders (competency of leadership and employees) and society (public, customers and SHE aspects).
- Maintain the relationship between shareholders, all stakeholders and leadership through accountability, responsibility and transparency in communications.
- Practise directors' fundamental duties and responsibilities (good faith, care, skill and diligence) in the best interest of shareholders and the organisation.
- Conform to and comply with the code of conduct and relevant Acts, such as the PFMA.
- Meet the performance strategy in action through business goals and objectives, effective management of resources and results driven actions.
- Develop sustainability by contributing to business welfare and the community at large through triple bottom line action and results – economic, environment, social/health.

King (2006:22) states that good governance cannot be practised without identifying the framework in which an organisation operates. Diagram 3 depicts a framework of governance from which governance objectives are derived (Hendrikse & Hendrikse, 2004:108).

Diagram 3: Governance Framework

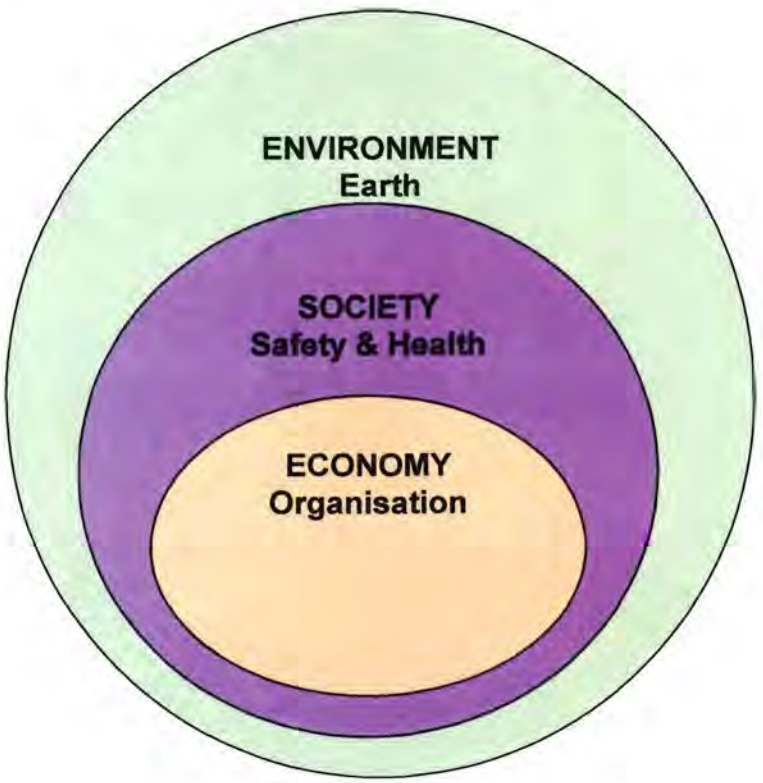


Source: Adapted from Hendrikse and Hendrikse (2004:108).

Mallin (2004:74) postulates that although there is mixed evidence that a link exists between corporate governance and corporate performance, it appears that there is a widely held perception that corporate governance influences the bottom line. Du Toit et al. (2002:64) emphasise that the way and actions as well as determined priorities in which services are delivered can improve the general welfare of society, and this implies good or bad governance. King (2006:79) is of the opinion that corporate performance can be hampered by self-interest, self-concern, conformance overriding performance, pride and arrogance by directors. These so-called "corporate sins" lead to corporate failures.

Corporate governance interventions are needed to support the activities of social responsibility movements, ensuring that people are treated properly and that safe working conditions are guaranteed. Corporate social responsibility provides the essential social checks and balances on global business and corporate influence in the context of an organisation's operations as depicted in Diagram 4 (Hendrikse & Hendrikse, 2004:222).

Diagram 4: The context of an organisation's operations



Source: Adapted from Hendrikse and Hendrikse (2004:222).

Adhering to these governance principles within the context of an organisation's operations, the next sections address the specific challenges facing the test and evaluation facilities.

3.4 FINANCIAL CHALLENGES

According to Van der Waldt et al. (2002:31), the objective of the PFMA is to allow managers in the public sector to manage resources made available to them, as the aim of the PFMA is to control government expenditure and to make the public sector more effective and efficient in the utilisation of its resources. With the focus on outcomes and outputs, stable financial systems and processes (such as the budgeting process) that are open and transparent are needed, as well as the effective and efficient management of revenue, expenditure, liabilities and assets. The vision of the PFMA is to have unqualified consolidated financial statements prepared on the accrual basis, emphasising the importance of good management and accountability as well as the recognition of sound management information for enabling the various stakeholders to fulfil their responsibilities (Van der Waldt et al., 2002:31-32).

A shareholder's compact between the accounting authority and the executive authority of a public entity must be concluded annually, documenting the mandated key performance measures and indicators to be attained by the public entity (SA, 2006:86). In addition to the shareholder's compact a strategic corporate plan for the entity must be submitted to the relevant executive authority covering a period of three years, including strategic objectives and outcomes as well as business initiatives identified by the executive authority. The plan must include multi-year projections of revenue and expenditure; key performance measures and indicators for assessing the entity's performance in delivering the desired objectives and outcomes; and it must form the basis for the annual reports of the accounting authorities. A risk management plan, fraud prevention plan, asset and liability plan, capital expenditure programmes, and dividend policies must also be addressed in this corporate plan (SA, 2006:85-87).

The success of each organisation is engaged in the in-time and accurate production of management information as well as the production of operating plans, budgets and cash-flow forecasts (Hendrikse & Hendrikse, 2004:199). The accounting officer has to submit quarterly information on its actual revenue and expenditure, as well as a projection of expected expenditure and revenue for the remainder of the current financial year. Any non-compliance with the approved budget must be reported, with

reasons given for the non-compliance (SA, 2006:79). In terms of section 55(1)(b) of the PFMA, financial statements in accordance with generally accepted accounting practice (GAAP) must be prepared by public entities, and any material losses through criminal conduct and any irregular, fruitless and wasteful expenditure must be disclosed (SA, 2006:83-84). As described above, the key performance measures and indicators as well as the entity's actual performance against the strategic objectives and outcomes must be disclosed in the annual report (SA, 2006:84).

Emerging risks of the public entity must be identified regularly by conducting risk assessments. A risk management strategy, including a fraud prevention plan, must direct the internal audit effort and the prioritising of risks. It should determine the skills required of managers and staff to improve controls and to manage these risks. The strategy must be clearly communicated to all employees in order to entrench it in the language and culture of the entity (SA, 2006:81). The function of the internal audit is to maintain effective and efficient controls and to develop recommendations for enhancement or improvement by ensuring accountability and preserving corporate values. The controls should encompass the information systems environment; the reliability and integrity of financial and operational information; the effectiveness of operations; the safeguarding of assets; and the compliance with laws, regulations and controls (SA, 2006:82).

Van der Waldt et al. (2002:32) regard performance evaluation as a cyclical process, starting with strategic planning and moving through programme implementation and control towards performance evaluation. The achievement of objectives or outcomes identified in the Department's strategic plans by the accounting officers, executive authorities or other stakeholders, are determined through the evaluation of performance. Van der Waldt et al. (2002:34) furthermore stress that the Auditor-General's reports need to focus the legislature on significant matters and that the emphasis of the audit has to shift from compliance to rules towards evaluating performance.

In order to enhance accountability to the legislature, annual reports need to be tabled in the relevant legislature for scrutiny by the relevant Portfolio Committees on public accounts (Van der Waldt et al., 2002:33). Financial misconduct must be investigated within 30 days of the date of discovery of the alleged financial misconduct, and if the matter is confirmed a disciplinary hearing must be conducted in accordance with the relevant prescripts. The Auditor-General, the relevant executive authority and treasury

must be advised of any criminal charges laid against any person in terms of section 86 of the Act (SA, 2006:92). The Standing Committee on Public Accounts (SCOPA) is the final arbiter of the financial performance of accounting officers, and should accounting officers not have implemented appropriate financial management measures or not have addressed audit queries adequately or failed to implement corrective actions suggested by the Auditor-General or SCOPA, executive authorities should utilise specified sanctions to address the misconduct (Van der Waldt et al., 2002:34).

In the procurement of services resources, BEE plays a vital role in the test and evaluation facilities. BEE is driven by legislation and regulation where an integral part of the Broad-Based Black Economic Empowerment Act, Act No 53 of 2003, is the balanced scorecard measuring an organisation's empowerment progress in the following broad-based areas (Koekemoer, 2006:11):

- Direct empowerment through ownership and control of enterprises and assets.
- Management at senior level.
- Management and development of human resources and employment equity.
- Indirect empowerment through preferential procurement, enterprise development and corporate social investment.

The codes of good practice, which govern how companies do business in South Africa, allow global and multi-national companies some flexibility in how they structure their empowerment deals (Black Economic Empowerment, 2008). The BBBEE balanced scorecard is defined and elaborated in the BEE codes of good practice; it is binding on all state bodies and public companies and is applicable on all economic decisions, such as procurement, licensing and concessions, private-public-partnerships, and the sale of state-owned assets or businesses (Koekemoer, 2006:11). Warby (2008:1) elucidates the generic scorecard by explaining the point values (total of 100) allocated to the seven elements of ownership (20 points), management control (10 points), employment equity (15 points), skills development (15 points), preferential procurement (20 points), enterprise development (15 points) and socio-economic development (5 points).

The elements in the codes of good practice on BEE are summarised in Table 6 (SA, 2007b:22-95).

Table 6: Elements in the codes of good practice on Black Economic Empowerment (BEE)

	Elements	Description
1.	Ownership	An enterprise receives points for the participation of Black people in its rights of ownership by holding their rights of ownership as direct participants or as participants through some form of business, such as a company with shares, a closed corporation, a co-operative, a broad-based ownership scheme or a trust, to mention but a few.
2.	Management Control	A measured entity receives points for measuring the management control element of BBBEE by meeting the targets for participation of Black people and Black women at board and top management level and filed with the Department of Labour under the Employment Equity Act.
3.	Employment Equity	The criteria for measuring employment equity are specified in a specific formula and wherever possible an entity must use the official data that was filed with the Department of Labour under the Employment Equity Act.
4.	Skills Development	Entities can only receive points on the skills development element if they meet the requirements of the Skills Development Act and the Skills Development Levies Act and after they have registered with the applicable SETA and provided a Workplace Skills Plan targeting the development for specifically Black employees.
5.	Preferential Procurement	In the calculation of the preferential procurement, all goods and services procured by the entity (e.g. cost of sales, operational expenditure, pension and medical aid contributions, and capital expenditure), except for certain permissible exclusions (e.g. taxation, public sector procurement, and certain imported goods and services), are measurable to determine the preferential procurement scorecard. The key intention of this element is to utilise Black owned professional service providers and entrepreneurs as suppliers.

	Elements	Description
6.	Enterprise Development	Entities can score points for any qualifying enterprise development contributions that are quantifiable as a monetary value, using a standard valuation method and a specific formula for calculating the individual criteria on a cumulative base - enterprise development contributions consist of monetary or non-monetary recoverable or non-recoverable contributions to beneficiary entities with the objective of assisting or accelerating the development, sustainability and ultimate financial and operational independence of that beneficiary.
7.	Socio-Economic Development	Entities receive recognition for any socio-economic development contributions that are quantifiable as a monetary value using a standard valuation method. The specific objective is encountered in the facilitating of sustainable access to the economy of the beneficiaries.

Janisch (2007:20) is of opinion that the previous BEE structures were flawed and that BBBEE needs to create opportunities for the entire South African population, being implemented within the context of sound business practice. He argues that the whole broad-based BEE process is a journey covered in a ten-year plan and is not accomplished by concluding a BEE deal. One of the challenges, according to Ndwandwe (2006:40), is the raising of finance for BEE companies. He suggests that financial institutions need to use criteria that are aligned to broad-based empowerment requirements in evaluating BEE business plans and should acquire a stake in these businesses in order to mentor and oversee business practises to minimise risk. This support to BEE companies can enlarge the supplier basis of products and services to the test and evaluation facilities, which is currently limited.

The test and evaluation facilities need to strive towards the words of the Department of Trade and Industry in their BEE strategy document: "Our country requires an economy that can meet the needs of all our economic citizens – our people and their enterprises – in a sustainable manner". This can only be achieved if the full potential of all persons and communities in the country is exploited (Black Economic Empowerment, 2008).

3.5 HUMAN RESOURCE CHALLENGES

Saunders (2006:45) states that "strategic human resources in the South African context is an interesting and challenging world to work in". She argues that the unique challenges organisations face stem mainly from the country's political paradigm, "forcing us to deal with unique issues and situations". Government's intervention in these challenges is imbedded in the Employment Equity Act, 1998 and updated with the Code of Good Practice regarding preparation, implementation and monitoring of Employment Equity (EE) plans. The broad objectives of the plan should be specified and a timetable developed for a period that will allow the employer to make reasonable progress towards achieving employment equity between one year and five years, taking into account the particular circumstances and strategy of the employer (Employment Equity Act, 1998).

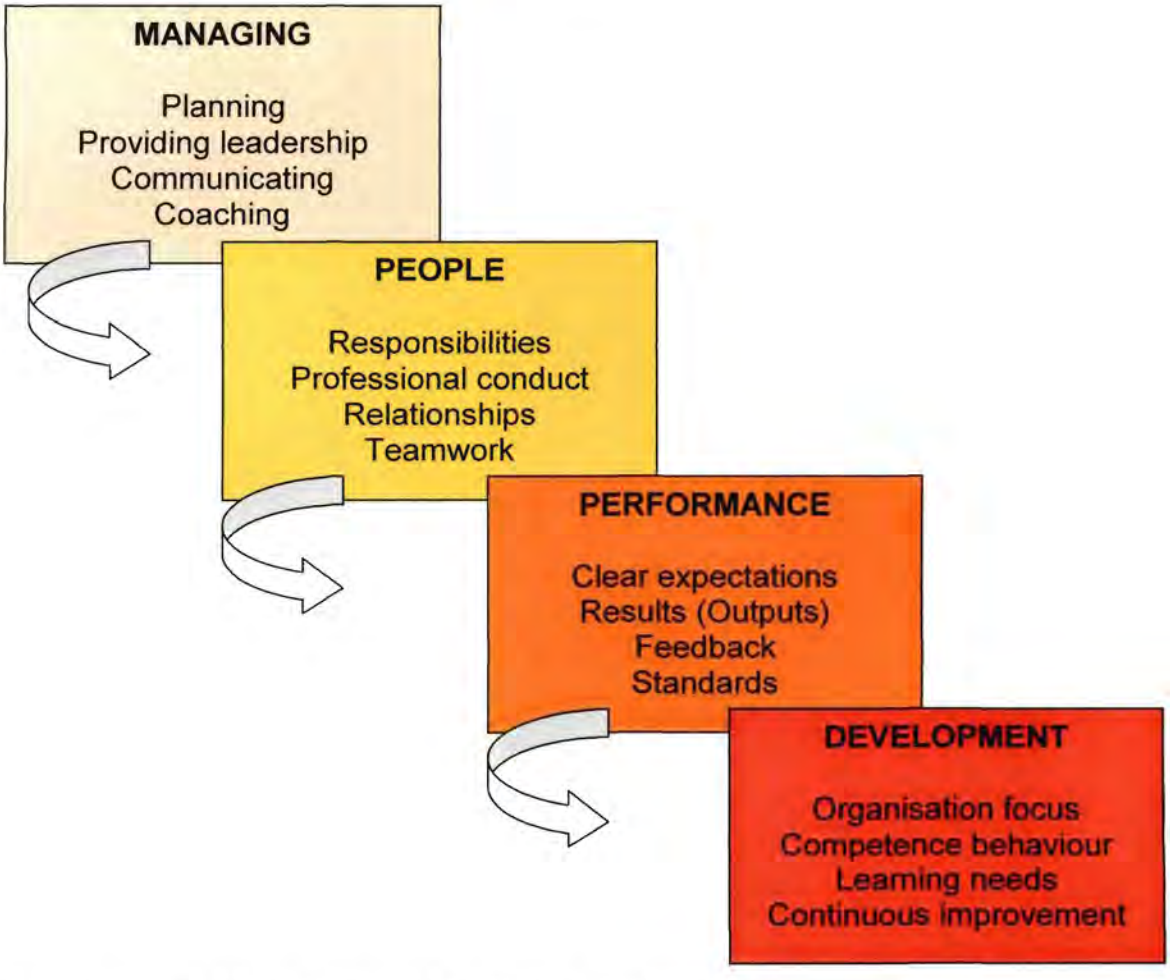
Affirmative action measures must be developed by the employer and incorporated in the EE plan to improve the under-representation of designated group members. These measures relate inter alia to the following (Employment Equity Act, 1998):

- Appointment of members from designated groups, including transparent recruitment strategies such as appropriate and unbiased selection criteria, selection panels and targeted advertising.
- Increasing the pool of available candidates through community investment.
- Training and development of people from designated groups through development programmes like learnerships and internships, on-the-job mentoring and coaching, as well as accelerated training for new recruits.
- Promotion of people from designated groups through structured succession and experience planning.
- Retention of people from designated groups through a more diverse organisational culture, an interactive communication and feedback strategy, and labour turnover analysis.
- Reasonable accommodation for people with disability through the provision of an enabling, accessible working environment.
- Steps to ensure that employees from designated groups are filling positions that enable them to participate in corporate decision-making processes.
- Steps to ensure that the corporate culture of the past is transformed to ensure diversity in the workplace and harnesses the potential of all employees.

Numerical goals should be developed for the appointment and promotion from designated groups in order to align the representation of all groups in each occupational category and level in the employer's workforce. The EE plan should be appropriately and comprehensively communicated to employees as well as the responsible people for the implementation of the plan (Employment Equity Act, 1998).

Challenges and risks within human resources will revolve around the functions of management, people, performance and development. Diagram 5 depicts a people management approach guided by Carter and McMahon (2005:17) that is applicable in dealing with human resource challenges and risks in the test and evaluation facilities.

Diagram 5: A people management approach



Source: Adapted from Carter and McMahon (2005:17).

The managing function, including the planning of the people management approach, the provision of leadership, coaching the team and the communication of the approach to all stakeholders, is critical as all other functions will succeed or fail depending on the successful execution of this function (Carter & McMahon, 2005:17). Carter and McMahon (2005:19) elaborate on the functions and view responsibility acceptance by team members guided by professionalism from management as well as honesty, respect and dignity as essential in the development of harmonious workplace relationships. They continue and elucidate on the importance of clear expectations of individual employees, confidence and competency of employees, followed by the recognition and rewards given through performance management. In conclusion of their approach, they enlighten the necessity of lifelong learning, focussed on the needs of the organisation in order to succeed in continuous improvement (Carter & McMahon, 2005:21).

King and Anderson (2002:23) postulate that there are four broad strategies for an organisation to follow in order to increase creativity of its employees: brainstorming in the generation of new ideas; skills training for successful creative performance; recruitment of creative individuals; and lastly, changes in the characteristics of an organisation – such as its structure, climate and culture – in ways that facilitate creativity. Dearing (2007:27) supports this by emphasising that training in creativity techniques and tools is the answer to future quality systems, as creativity becomes essential in producing better products and services. Dearing (2007:27) further believes that quality products and services are the result of good people with experience, education and training, managed by good leaders. Excellent, relentless, widespread training and education as well as good communicators in key positions are the key to service excellence in an organisation.

The foundation for assessing and fulfilling the personnel needs of an organisation lies in job analysis and selection methods. Job analysis defines the tasks to be performed, the context of the work and the human attributes required to perform the work (Hoffmann, 2001:23). Saunders (2006:45) postulates that other methodologies than the standard personality testing are needed in the recruitment of candidates, and that the competency-based approach in assessing people is valued in recruitment, performance management and the identification of training needs. She concludes her argument by emphasising the value of assessment tools to identify those areas that require development in order to elevate peoples' level of competency to the needs required in their career planning. Organisational performance is refined by job analysis

and the validation of selection methods, and Hoffmann (2001:32) regards recruitment of the best qualified people for a particular job as one of the most important issues in an organisation. Wilson (2001b:65) elaborates on this by stating that successful recruitment leads not only to a better quality of work life for employees but also to improved productivity in the organisation.

Measuring, analysing and communicating employee turnover play vital roles in the success of an organisation, and the cost relating to employee turnover is elucidated by Howse (2001:47). He explains that additional recruitment, training and performance losses attributable to unnecessary and unwanted employee turnover will increase costs and will have a negative effect on employee morale. It is important however to analyse the causes behind the turnover trends, to contemplate what influences contributed to the trend affecting the success of the organisation, to communicate the turnover results and to find creative ways to prevent unwanted turnover (Howse, 2001:48, 63).

Monat (2001:123) maintains that as businesses move into the information age, the demand for training and development in organisations will increase in order to fulfil continuous improvement initiatives. Buckley and Monks (2005:53) embark on the rationale that managing employee development has gained increased attention and importance due to the belief that future competitiveness advantage lies in the development of the creative human capital of the organisation. With the focus on continuous learning, the development of the human resource development function was accelerated and the importance of training was elevated in many organisations. The evaluation of training and development programmes is regarded by Monat (2001:129) as critical to management, as the benefits that an organisation receives from training should be weighed against all costs of providing the training in its context. Hoyle (2006:316) explains that individual competence is concerned with the ability of a person to achieve a result, whereas training focuses on the acquisition of skills to perform a task and education focuses on the acquisition of knowledge. This so-called competency-based approach determines whether a person is able to achieve the desired outcome which meets all the required standards.

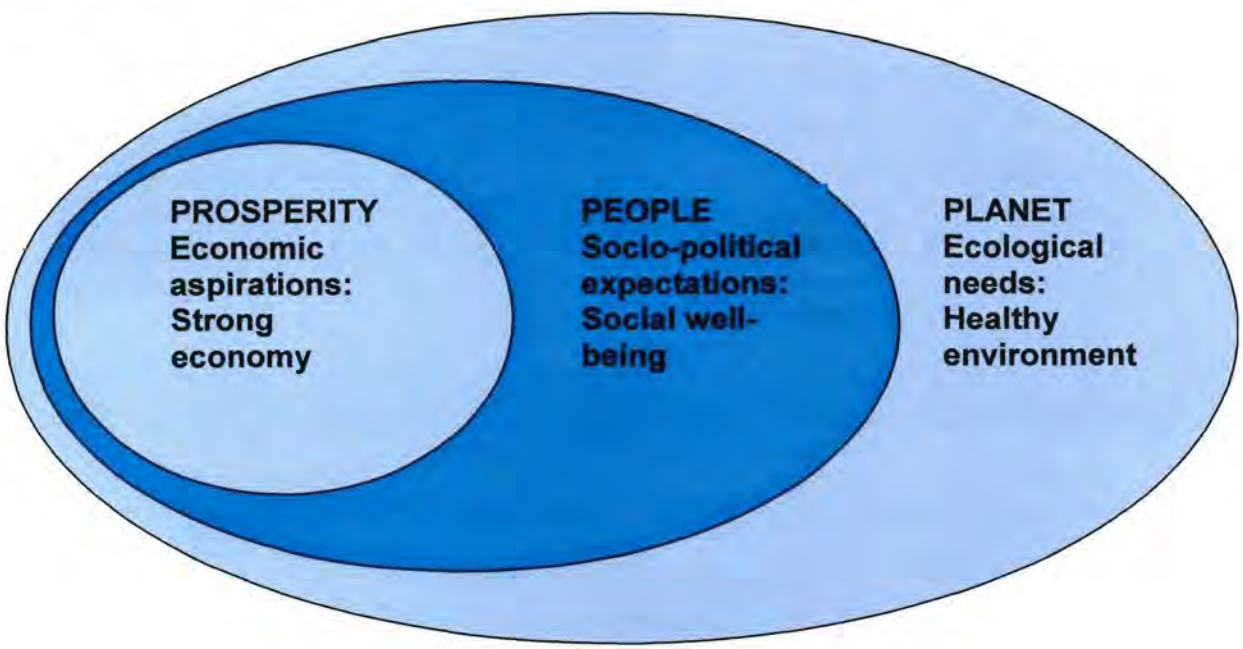
The above viewpoints of experts in the human resources field and the Acts of government guide the test and evaluation facilities in finding solutions to the various challenges they have to face. In the next section, the safety and health and environmental issues influencing human capital are discussed.

3.6 SAFETY, HEALTH AND ENVIRONMENTAL (SHE) CHALLENGES

General SHE management principles, approaches, strategies and concepts are challenges for sustainable development in each organisation. External factors such as environmental regulations as well as internal factors such as the sensitivity of the general public (including the employees) to environmental issues, are forces that require an organisation to develop an environmental management system (Clements, 1996:20-21).

Business ethical principles as formulated in the King 2 corporate ethics report, legal principles dealing with constitutional basic rights, as well as principles dealing with the caring for the earth, impact on occupational health and safety (North-West University, 2007:16). Sustainable development is defined by Brundtland (as quoted by North-West University, 2007:2, 4) as "meeting the needs of the present without compromising the ability of future generations to meet their own needs" and is measured by the triple bottom line success, depicted in Diagram 6.

Diagram 6: Sustainable Development – Triple bottom line success



Source: Adapted from Brundtland (as quoted by North-West University, 2007:4).

Economic prosperity can be sustained through the wellbeing of people and a healthy environment. Environmental management oversees the sustaining of the organisation's natural capital asset by managing the air to breathe, water to enjoy and usable land by putting people and their needs first in terms of environmental criteria and carrying capacities (North-West University, 2007:4-9). Occupational Health and Safety (OHS) is a cross-disciplinary area concerned with protecting the safety, health and welfare of employers, employees and co-workers that are engaged in work or employment, as well as family members, customers, suppliers, nearby communities and other members of the public who are impacted by the workplace environment (North-West University, 2007:23). The OHSAS 18001 health and safety management system enables an organisation to take care of the wellbeing of its employees, to improve motivation and employee work, to fulfil customer requirements, to provide structure and to create positive company image leading to competitive advantage (Holt, 2007:31).

In the elimination of accidents in the workplace, Behavioural Based Safety (BBS) plays a valuable role. Prior (2008:30, 32) stresses that safe behaviour is as important amongst top management as it is for frontline workers, and that BBS will have limited success without the involvement of management and supervisors. Safe behaviour begins in the boardroom and top management has to demonstrate commitment to safety and prioritise it in decision-making and "walk the talk" before employees will change their ways. Management's visible behaviour in addressing the employees and conducting discussions with trade unions should model the behaviour expected in the organisation. Prior (2008:32) concludes his argument by stating that "BBS is best used as part of a broad safety improvement drive when the safety issues have been properly diagnosed".

The biggest challenge to health and safety in today's workplace is HIV/AIDS. According to Von Moltke (2008a:22), managing HIV/AIDS is not only a "moral obligation" but a "business imperative". HIV/AIDS policies should be formulated by all organisations and no discrimination against infected people should be allowed. Practices should encourage employees to know and own their status. The author continues by stating that HIV risk management begins with identifying and understanding that a risk exists, evaluating the risk in terms of the organisation's environment and, finally, finding the means of controlling that risk. An attitude change towards HIV/AIDS is necessary before this disease can be effectively managed and not

only the organisation but the South African economy and society as a whole cannot be mutually exclusive (Von Moltke, 2008a:24).

An environmental management system (EMS) is a comprehensive, well-documented and structured approach addressing regulatory, corporate and customer requirements relating to environmental issues (Clements, 1996:1). The ISO 14000 environmental management standards can be used by organisations to minimise their negative operational impact or effect on the environment (air, water or land). ISO 14000 specifies requirements for establishing an environmental policy, plans environmental objectives and measurable targets, checks and controls activities and implements corrective action during management review. The ISO 14000 standard is regarded as an approach that systematically reduces the impact of the environmental aspects that are under the control of the organisation (ISO 14000, 2008).

Clements (1996:52-54) identifies the following steps that lead to a cost-efficient and effective environmental management system:

- Management commitment to the system.
- Initial review of the organisation's current management practices, record keeping, policies, training and other resources dedicated to meeting environmental needs.
- Establishment of an environmental policy with specific goals and measurable targets.
- Establishment and implementation of an environmental action plan with quantified targets on items such as scrap rates, decibels of noise allowed, recycling and waste disposal.
- Evaluation of the environmental aspects and risks to determine the level of risk involved with conformance and non-conformance, including an estimation of cost/benefit ratios.
- Monitoring the environmental control process for improvement opportunities in order to exceed targets.

As environmental management can sometimes hinder economical progress and cause confusion, the above steps and the ISO 14000 series environmental management systems can be used to meet an organisation's obligations diligently and professionally and with the minimum of fuss (ISO 14000/ISO 14001, 2008). Briggs (2005:80-81) is of

the opinion that commitment to compliance with environmental policy statement commences when turning commitment into action. He states that it is necessary to evaluate not only the implementation and effectiveness of EMS requirements, but also to evaluate the organisation's compliance with legal requirements.

Conformance to environmental regulations and customer requirements, better use of resources, greater marketability, improved management confidence and improved community image are some of the benefits an environmental management system can create for an organisation (Clements, 1996:24-28).

In finding solutions to the above challenges, the test and evaluation facilities can ensure that they conduct their activities in a responsible manner and that they are committed to sustainable development. The next section captures the accreditation requirements that are necessary if the facilities are to deliver against international and military standards, and the challenges involved.

3.7 TEST AND EVALUATION ACCREDITATION CHALLENGES

In providing test and evaluation services, the burden is on the test and evaluation facilities not only to obtain official accreditation to render specific test and evaluation services, but also to maintain such accreditation and to execute the services against military or international standards. Standards fulfil both the role of bridging the gap in technology transfer and ensuring that quality and integrity for services are maintained. Unreliable and non-standard technology can be eliminated early in the process, which will contribute to the success of a service (Armscor, 2008a).

The RSA Military Standards Steering Committee (RMSS) is structured to function as a governmental control mechanism with three partners – the SANDF, Armscor and the SABS – and is the authority responsible for the standardisation of all military requirements. Standardisation entails the development, maintenance and approval of RSA military documents, as well as the acceptance or formal adoption of external national, international or commercial standards and specifications for military purposes (Armscor, 2008b). In the development of a RSA-Military Standard the RMSS follows the following process (Armscor, 2008a):

- Clarifying a user requirement through extensively ascertaining the validity of the need and verifying whether any alternative standard exists that can be used instead or that can be tailored. The RMSS needs to determine to what extent the development of the document will be to the benefit of standardisation and to other users as well.
- Examining the source of funding for a project.
- Considering management aspects, such as the allocation of a project leader and representatives.
- After approval by the RMSS the project is registered as a RSA-Military standards project with an allocated number.
- Promulgation and issuing of the standard.

Opportunities exist for people (also within the test and evaluation facilities) with specific knowledge to directly or indirectly participate in the development or upgrading of standards. Constant feedback in terms of progress is expected from the RMSS in order to create acceptable and useful standards that serve their purpose (Armscor, 2008a).

ISO 9001:2000 and ISO 17025:2005 quality management standards are of importance in this research, as these standards apply to the test and evaluation environment in which service operations are conducted. The purpose of the ISO 9000 family is to assist organisations to operate effective quality management systems. According to Hoyle (2006:4), the purpose of ISO 9001 is that "it provides an equitable basis for assessing the capability of organisations to meet customer and applicable regulatory requirements". The scope of ISO 9001 is to define the requirements of a quality management system and setting interrelated ideas, principles and rules in order to enable organisations to continually satisfy their customers – it is to be perceived as general business concepts and not simply as limited to the achievement of quality (Hoyle, 2006:89, 103).

Dearing (2007:23) identifies three definite benefits of ISO 9001: it provides discipline, it contains the basics of a good quality system, and it offers a marketing tool in the organisation. Discipline in quality is created through routine revisions of the quality system by third party audits. Understanding the customer requirements and meeting these requirements are embedded in the ISO process, as well as the assurance that the equipment and support services are available to meet the service requirements with the necessary corrective actions where problems were identified (Dearing,

2007:23-24). Hoyle (2006:93) is furthermore of the opinion that many organisations were driven to seek ISO certification by pressure from customers, rather than as an incentive to improve business performance.

It is important to note that ISO 9001 is not without flaws. Dearing (2007:25) argues that the root flaw of ISO is its reliance on third-party audits. According to him, quality is not guaranteed by audits and audits take time away from more productive activities. He also maintains that rules, including ISO 9001 requirements, do not necessarily prevent or solve problems, and that most documents do not make good products or services but are pure cost creators. He concludes his argument by stating that "more than half of the requirements of ISO 9001 do not contribute directly to controlling or improving quality" and he regards these requirements as an overhead burden.

Hoyle (2006:119) suggests that the greatest value to be obtained by an organisation is to use the entire family of standards in an integrated manner - ISO 9001:2000 achieves a first level of performance, ISO 9001 focuses on customer satisfaction, and ISO 9004 is for the preparation of a national quality award. He points out that synergy exists between ISO standards and other methodologies such as Six Sigma, as discussed in the previous chapter. He is of the opinion that there is nothing in the Six Sigma methodology that should not be included in the ISO 9001 approach. All the elements of the DMAIC technique, which is the enabling methodology for Six Sigma programmes, can be matched to the ISO 9001 requirements (Hoyle, 2006:133, 135).

The ISO 17025:2005 standard specifies the general requirements for the competency of testing and/or calibration organisations to execute the tests and/or calibrations. This standard is used by laboratories to develop their management system for quality, administrative and technical operations in accordance with ISO 9001 (Standards South Africa, 2005:1-2). Policies, systems, programmes, procedures and instructions to assure the quality of the test and/or calibration results should be documented. The laboratories must carry out their testing and calibration activities in such a way that the needs of the customer and the regulatory authorities are met, and they must have the relevant managerial and technical personnel who have the authority and resources needed to carry out their duties (Standards South Africa, 2005:2-3). Competency of all who operate specific equipment, perform tests and/or calibrations, evaluate results, and sign test reports and calibration certificates must be ensured through appropriate education, training, experience and demonstrated skills (Standards South Africa, 2005:11).

In the quest for continuous improvement, test and evaluation facilities must continually improve the effectiveness of their management system through the use of the quality policy, quality objectives, audit results, analysis of data, corrective and preventative actions and management review, as described in the ISO standards. With the identification of improvement opportunities, or when preventative action is required, action plans should be developed, implemented and monitored to reduce the likelihood of the occurrence of such non-conformities and to utilise the opportunities for improvement (Standards South Africa, 2005:7-8).

In addressing the above test and evaluation accreditation challenges, the test and evaluation facilities will be able to deliver efficient, effective, safe and reliable services to their customers.

3.8 CONCLUSION

Guided by governance principles within economic efficiency and the shareholder's welfare, various challenges facing the test and evaluation facilities were discussed in chapter 3. The King 2 Code of Corporate Practice and Conduct as well as the characteristics of good public and corporate governance within the structured governance framework were discussed. Treasury regulations as legislated by the PFMA, business and management information – including strategic plans, operating plans and budgets – as well as the legislated BEE requirements as prescribed by the BBBEE codes of good practice were highlighted.

The interesting and challenging world of human resources in South Africa became evident in the discussion of a people management approach in assessing and fulfilling the personnel needs of an organisation within the sphere of employment equity. Occupational health and safety as well as environmental management were addressed in order to sustain economic prosperity through the wellbeing of people and a healthy environment. The wellbeing of an organisation's employees, the fulfilment of customer requirements and the provision of a structure to create positive company image towards SHE management were discussed.

Test and evaluation challenges, including test requirements against military standards and ISO standards, were defined and elaborated on in this chapter, and the benefits

and pitfalls of these standards were highlighted in order to establish the value of accreditation for the test and evaluation facilities.

The importance and validity of the challenges described in this chapter are tested in the empirical study, which is conducted in the next chapter.

CHAPTER 4

SERVICE EXCELLENCE MODEL: EMPIRICAL FINDINGS

4.1 INTRODUCTION

Management models, tools and approaches to improve quality through an integrated quality management system and incorporated in a service excellence model were discussed in the previous chapters. The service excellence model needs to steer the test and evaluation facilities towards service excellence and needs to address the challenges these facilities will experience in obtaining service excellence within the boundaries of public and corporate governance. The previous chapters elaborated on financial challenges, human resource challenges and environmental challenges, and the possible solutions to these challenges, as well as on accreditation standards to be obtained in test and evaluation services. Applicable Acts and requirements within the corporate governance sphere were explored in order to align the service excellence model in the provision of service excellence.

This chapter deals with the research methodology used, the research design and the way in which data were collected, analysed and interpreted in the test and evaluation facilities as the locus and focus of this research. The two main approaches to research will be highlighted, after which a more detailed discussion will follow on the qualitative approach on which this study was based. The construction of the questionnaire, which serves as a measurement tool to evaluate and validate the data obtained in the literature study, is discussed, as well as the choice of the respondents that took part in the study. Problems encountered in the survey will also be addressed. The outcome of data collected by means of questionnaires is presented in such a way that the logical interpretation of findings serve as the basis to address the problem statement.

4.2 RESEARCH METHODOLOGY

Research methodology refers to more than a simple set of methods, as it covers the rationale and the philosophical assumptions underlying a particular study (Methodology, 2008). The next section will give a brief description of research methodology.

4.2.1 Description of research methodology

Research methodology considers and explains in a scientific way the logic behind research methods and techniques in attaining knowledge of human behaviour (Welman et al., 2005:2). Dane (1990:31) views the relationship between research and theory as an extremely strong one, where research results are placed in the context of existing theory and where existing theory provides a framework for new research ideas. The application of proper scientific research as well as the methodology are important, and according to Struwig and Stead (2001:25) two basic or main approaches, namely the quantitative approach and the qualitative approach, are used by researchers to collect, analyse and interpret information. De Vos et al. (2002:365) mention that a combination of quantitative and qualitative approaches exists and that the concept of triangulation is used to designate the conscious combination of the two approaches.

Research methodology encompasses three important concepts, described by McNeill (1990:14) as reliability, validity and representativeness. If the method of collecting data is reliable, it means that whenever the research is repeated the same results would be obtained. Validity refers to whether the data collected is a reflection of the true picture that is being studied, whereas representativeness refers to the group of people as being typical of others.

Stainback and Stainback (as quoted by Welman et al., 2005:8) enlighten the difference between quantitative and qualitative research by stating that the purpose of quantitative research is "to evaluate objective data consisting of numbers" whilst qualitative research "deals with subjective data that are produced by the minds of respondents". Quantitative data are presented in numbers, whilst qualitative data are presented in language. Quantitative methods include hypothesis testing, power analysis, observational studies, resampling, randomised controlled trial and high-dimensional analysis, among others, whilst qualitative methods include the case study, phenomenology, grounded theory and ethnography, among others (Methodology, 2008).

Through the above descriptions it is clear that the research study on the test and evaluation facilities embarks on the qualitative approach, which will be discussed in the next sections.

4.2.2 Description of qualitative research

Struwig and Stead (2001:11) are of the opinion that it is quite difficult to define qualitative research as there are many research methods that can be associated with and reconcile within the boundaries of qualitative research. Patton (as quoted by LeCompte et al., 1992:736) argues that qualitative research is a holistic process seeking illumination and understanding, rather than a linear process that seeks causal determination and prediction. She claims that creativity is an important part of qualitative research within a scientific approach, whilst Leedy and Ormrod (2001:158) introduce their opinion that the potential source of data is limited only by the researcher's open-mindedness and creativity.

Welman et al. (2005:188) describe qualitative research fundamentally as a descriptive form of research, whereas Denzi and Lincoln (as quoted by Struwig & Stead, 2001:11) view qualitative research as a multi-paradigmatic, interdisciplinary and multi-method approach to research studies, which can be applied in a variety of subject fields. Van Maanen (as quoted by Welman et al., 2005:188) echoes the above and regards qualitative research as an "umbrella" phrase "covering an array of interpretive techniques which seek to describe, decode, translate and otherwise come to terms with the meaning of naturally occurring phenomena in the social world". Leedy and Ormrod (2001:147) emphasise that the phenomena occurs in the "real world" and that qualitative research deals with this phenomena in all its complexity.

Leedy (1989:140, 173) mentions the value of the historical and descriptive survey methods in which the observation of the data by the researcher and the description thereof in words play a vital role. The term "descriptive research methodology" assumes that whatever is observed at any one time is normal and could under the same conditions be observed again in future. According to Welman et al. (2005:193), "descriptive design" captures the investigation results amongst individuals or groups within a given community, group or organisation.

Qualitative research thus focuses on the quality of the study in a holistic manner, presenting the research results in descriptive words, and not on statistically processes to solve problems in the "real world". In the next section the characteristics of qualitative research are discussed.

4.2.3 Characteristics of qualitative research

Bryman (as quoted by Struwig & Stead, 2001:12) is of the opinion that qualitative researchers attempt to approach a research problem in an unstructured manner and with open-mindedness. He argues that this approach limits the influence of theory and prior research to the understanding and interpretation of the events being researched. Stainback and Stainback (as quoted by Welman et al., 2005:8) share this opinion by adding that qualitative research is based on flexible and explorative methods. Data can be changed progressively in order to achieve a deeper understanding of what is being investigated, and the researcher can base his or her results on the daily events and behaviour of people by obtaining an "insider's view".

The perspective of participants forms an integral part of the research issues and it is the researcher's responsibility to analyse and interpret the research data in association with the participants. Bryman (as quoted by Struwig & Stead, 2001:12) states that contextualism, which is a comprehensive description and analysis of the environment of research participants, is indispensable, as human behaviour does not occur in a vacuum. The various macro and micro contexts of the individual and their interaction with one another are important for providing holism, which examines social environments in their totality. This holistic approach, which collects a wide array of data, however involves small samples of people studied by means of in–depth methods (Stainback & Stainback as quoted by Welman et al., 2005:8).

Cooper and Schindler (2001:140) state that qualitative research consists of several approaches that "are adaptable for exploratory investigations of management questions". Participant observation and in-depth interviewing are some of the elements of this approach. Interrelated events and the understanding of the influence of prior events on an individual's thoughts and behaviour are, according to Bryman (as quoted by Struwig & Stead, 2001:12) crucial in the research process and should be examined at an early stage. The population choice of the study is of vital importance, and according to Leedy (1989:142) data is "susceptible to distortion through the introduction of bias into the research design". The systematic presentation of the data is of essence to secure valid and accurate conclusions of the study, and Struwig and Stead (2001:25) conclude the argument by stating that the validation of findings is essential to secure credibility of the research.

By integrating the above characteristics, the design of the research, in particular the construction of the questionnaire and the choice of the population, is dealt with in the next section.

4.3 RESEARCH DESIGN

Dane (1990:18) is of the opinion that the ultimate goal of research is to be able to answer the questions asked. He explains that the different ways in which the same question can be asked varies, from exploration, description, prediction and explanation to action. Evaluating research involves the questions of what, where, when, how and who, and Cooper and Schindler (2001:134) conceptionalise research design as "the plan and structure of investigation so conceived as to obtain answers to research questions". Welman et al. (2005:192) however are of the opinion that emergent designs where researchers may adapt their data-collecting procedures during the study in order to benefit from additional information obtained, is of advantage.

The above points to the integration of a number of critical components, which will be briefly outlined in the following paragraphs to indicate how the theory and principles of research design are applied in this research.

4.3.1 Construction of the questionnaire

The measurement tool used in this research was an interviewer-administered questionnaire which was designed to obtain information and data from participants involved in the test and evaluation facilities, with the view to developing an integrated service excellence model for the test and evaluation facilities. This designed questionnaire, for comparing information and data between theory on service excellence, governance principles and current performance indicators, was used to conduct a standardised interview with the said participants at senior and top management level.

The questionnaire was divided into the following sections:

- Section A: Biographic information - this information is necessary to determine the respondents' level of experience in government and public entities, their knowledge of corporate governance principles and test and evaluation

activities, their involvement in decision-making processes, and their involvement in the process to find solutions to management challenges.

- Section B: Quality Management Approaches – this information is necessary to determine the role and importance of the quality management systems that are used in the various test and evaluation facilities. The current status of efficiency, effectiveness and adaptability, as well as the support of customer and supplier relationships need to be determined in order to create a continuous improvement environment in the search for service excellence.
- Section C: Performance Management Systems – this section determines the level of effectiveness of the performance management systems that are used in the various test and evaluation facilities. The importance and successful implementation of performance measurement systems focussing on strategic objectives and critical goals will be evaluated and suggestions to improve the systems will be captured.
- Section D: Challenges in obtaining Service Excellence – this information is necessary to determine the level of sufficiency in which the test and evaluation facilities have applied business practices to ensure control over strategy and management activities in order to serve the needs of the shareholders. Knowledge and the level of implementation of governance principles, as well as the applicable financial, human resource and environmental Acts and regulations need to be determined and suggestions to address these challenges in a more effective way need to be captured.

4.3.2 Study population, sample size and selection

This study was conducted amongst thirty-four (34) management members of the Weapon and Ammunition Test Range (Alkantpan), the Vehicle and Product Test Facility (Gerotek), the Overberg Missile Test Range (OTB), the Paardefontein Explosives Facility and the Paardefontein Antenna Test Range respectively, as well as decision-makers in the South African National Defence Force (SANDF) and the Defence Secretariat representing the SANDF and the Defence Secretariat in the governance and migration workgroup on the establishment of the DERI.

The research was conducted on all twenty-six (26) members of the management teams of the facilities mentioned (100%) and on eight (8) of the twelve (12) members (67%) of the governance and migration workgroup on the establishment of the DERI. The viewpoints of all thirty-four (34) respondents and their perceptions of their individual

and team's knowledge, expertise and involvement in specific systems, principles and processes needed in the effective and efficient delivery of test and evaluation services, thus represent the overall view of the managerial role players and decision-makers in the test and evaluation facilities mentioned and of the workgroup on the establishment of the DERI.

4.3.3 Problems encountered

As this study was conducted at different test and evaluation facilities located in the different government departments, the low level of synergy in management systems and communication strategies between these facilities and the various government departments became evident in the completion of the interviewer-administered questionnaire by the researcher and the respondents. The responses of the various management teams within their departmental management systems and viewpoints did however contribute to the development of the integrated service excellence model.

The lack of in-depth knowledge of the detailed and specific activities at the test and evaluation facilities by the representatives on the governance and migration workgroup necessitated more explanations by the researcher during the interviews in order to address uncertainties and unqualified perceptions of the services provided by these facilities. If the uncertainties had not been addressed during the interviews, the data obtained could have been distorted, which proved the value of making use of an interviewer-administered questionnaire. The contributions of the members of the workgroup were incorporated in the service excellence model and furthermore served to qualify specific client requirements and expectations of such a model in terms of service delivery.

4.3.4 Processing of data

The results obtained in the semi-structured interviews were processed by the researcher on MS Excel spreadsheet software, after which they were analysed and interpreted. The percentages as calculated from the questionnaires and the suggestions made by the respondents reflect the outcome of the empirical study. Computer-generated graphs and tables were used to reflect the values/perceptions and technical input of the respondents to the development of an integrated service excellence model.

The next section discusses the analysis and interpretation of the data collected as part of the empirical study conducted with the view to the development of an integrated service excellence model for strategic military related test and evaluation facilities.

4.4 ANALYSIS AND INTERPRETATION OF EMPIRICAL DATA

The responses of the management teams of the various test and evaluation facilities and those of the representatives of the workgroup were as follows:

4.4.1 Section A of the questionnaire: Biographic information

The biographic information indicates the respondents' years of experience in test and evaluation activities in both military and commercial environments in order to justify and value their input. Their level of knowledge on specific elements incorporated in the integrated service excellence model and their involvement in management challenges are an indication of the academically and managerial input to this empirical study as well as of the establishment of training needs for improving service delivery.

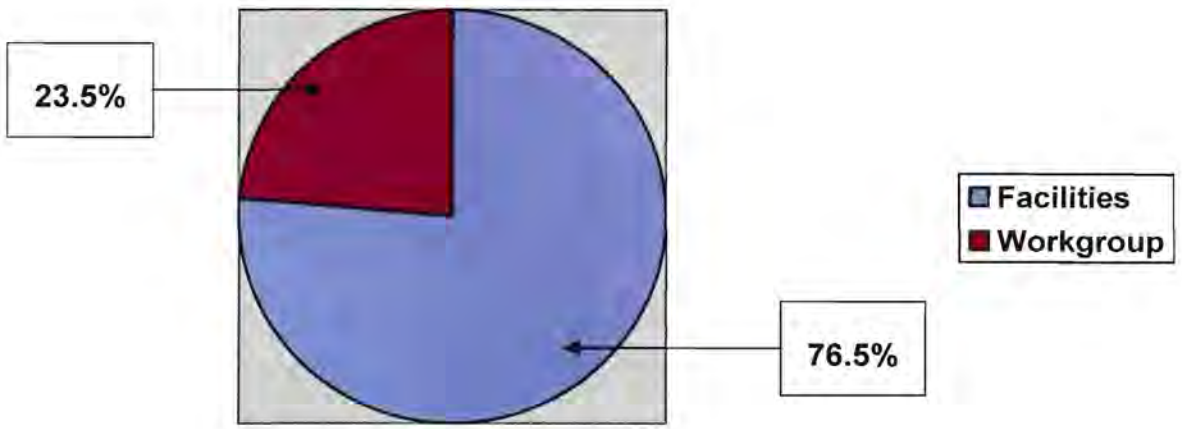
A1 Position of respondent

The following table reflects the thirty-four (34) respondents' position in his/her participation in the research study:

Employees of Test and Evaluation Facilities	DERI Workgroup Members	Total
26	8	34
76,5%	23,5%	100%

The majority of the respondents (76,5%) are directly involved in the management of the test and evaluation facilities, whereas the 23,5% DERI workgroup participants contribute towards the strategic positioning and establishment of the DERI. The above can be reflected graphically as follows:

Figure 4.1: Number of respondents per group



A2 Years experience in government departments and/or public entities

The evidence of experience amongst the total study population is clear, with over 75% having more than 16 years experience and only 11,8% of the respondents having ten years or less experience in government departments and/or public entities. This reflects a vast amount of experience in government departments and public entities, which can be channelled to the development and implementation of the integrated service excellence model. The following table shows the years experience in government departments and/or public entities:

	1- 5 years	6-10 years	11-16 years	17-24 years	25 + years
Facility	2 (7,7%)	2 (7,7%)	4 (15,4%)	6 (23,1%)	12 (46,1%)
Workgroup	0 (0%)	0 (0%)	0 (0%)	3 (37,5%)	5 (62,5%)
Total	2 (5,9%)	2 (5,9%)	4 (11,7%)	9 (26,5%)	17 (50,0%)

A3 Years experience in military test and evaluation activities

The following table indicates the years experience in military test and evaluation activities:

	1- 5 years	6-10 years	11-16 years	17-24 years	25 + years
Facility	4 (15,4%)	3 (11,5%)	2 (7,7%)	11 (42,3%)	6 (23,1%)
Workgroup	2 (25,0%)	3 (37,5%)	3 (37,5%)	0 (0%)	0 (0%)
Total	6 (17,6%)	6 (17,6%)	5 (14,7%)	11 (32,4%)	6 (17,7%)

Years of experience in military test and evaluation activities are evident amongst the management of the test and evaluation facilities, where 65,4% of the respondents have more that 16 years experience. Most of the participants in the DERI workgroup (62,5%) have ten years experience or less in military test and evaluation activities.

A4 Years experience in commercial test and evaluation activities

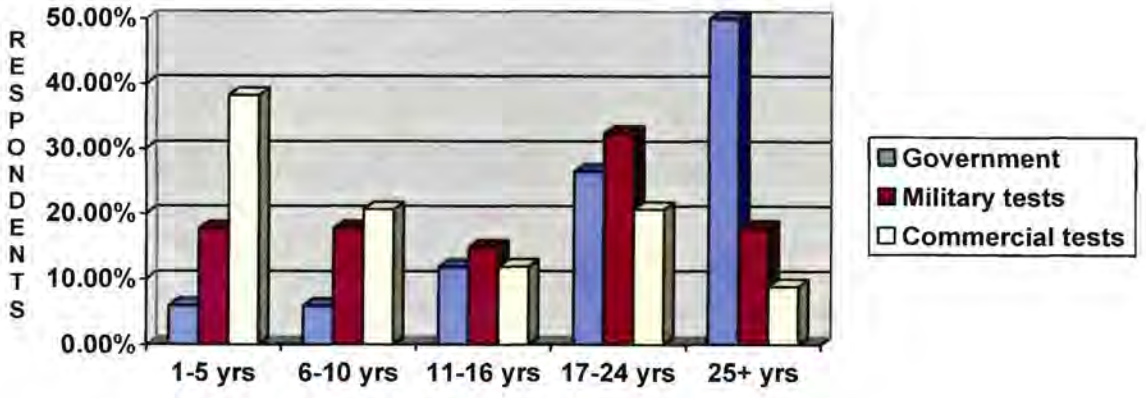
The following table indicates the years experience in commercial test and evaluation activities:

	1- 5 years	6-10 years	11-16 years	17-24 years	25 + years
Facility	11 (42,3%)	4 (15,4%)	1 (3,9%)	7 (26,9%)	3 (11,5%)
Workgroup	2 (25,0%)	3 (37,5%)	3 (37,5%)	0 (0%)	0 (0%)
Total	13 (38,2%)	7 (20,6%)	4 (11,8%)	7 (20,6%)	3 (8,8%)

More than half of the respondents (58,8%) have ten years experience or less in commercial test and evaluation activities. The level of experience of the respondents in the DERI workgroup is similar for military and commercial test and evaluation activities, with no experience above 16 years, whereas 38,4% of the facility managers have above 16 years experience in commercial test and evaluation activities.

Years experience in government departments, military test and evaluation facilities and commercial test and evaluation activities can be graphically presented as follows:

Figure 4.2: Years experience



The above graph indicates that the majority of respondents have more than 25 years experience in government departments, more than 17 years experience in military test and evaluation activities, and less than six years experience in commercial test and evaluation activities. This level of experience in test and evaluation activities within public entities constitutes a valuable contribution towards the development of the service excellence model.

A5 Knowledge of corporate and public governance principles

The researcher was interested in the respondents' level of knowledge of corporate and public governance, as well as their perceptions of knowledge of their respective management teams, in order to determine whether there is a correlation between the perception of own knowledge versus the perception of the knowledge of the team. The respondents' indication of their own knowledge of corporate and public governance principles as indicated in the following table, where 47% respondents rate their knowledge between 61-80%, is more than 30% of their rating of their management team's knowledge of the King Report on Corporate Governance and the Code of Corporate Practices and Conduct as depicted in section 4.4.4. This perception is clearly noted within the test and evaluation facilities and to a much lesser extent in the DERI workgroup. Only 17,7% of the respondents rate their own knowledge as being below 41%, in contrast with their more than 60% rating of their management team's knowledge as being below 41%. These results emphasise the need for management training on governance principles. The following table presents the knowledge available on corporate and public governance principles:

	0-20%	21-40%	41-60%	61-80%	81-100%
Facility	2 (7,7%)	3 (11,5%)	8 (30,8%)	11 (42,3%)	2 (7,7%)
Workgroup	0 (0%)	1 (12,5%)	1 (12,5%)	5 (62,5%)	1 (12,5%)
Total	2 (5,9%)	4 (11,8%)	9 (26,5%)	16 (47,0%)	3 (8,8%)

A6 Knowledge of quality management systems

The following table reflects the respondents' knowledge of quality management systems:

	0-20%	21-40%	41-60%	61-80%	81-100%
Facility	1 (3,9%)	4 (15,4%)	5 (19,2%)	7 (26,9%)	9 (34,6%)
Workgroup	0 (0%)	2 (25,0%)	3 (37,5%)	2 (25,0%)	1 (12,5%)
Total	1 (2,9%)	6 (17,7%)	8 (23,5%)	9 (26,5%)	10 (29,4%)

The knowledge of quality management systems is evident, with a majority of 29,4% of the respondents rating their knowledge above 80% and 20,6% below 41%. Although the knowledge of quality management systems is evident amongst the respondents' perceptions of their own knowledge, specific evaluations towards the effectiveness and efficiency of the quality management systems and approaches utilised in the test and evaluation facilities follow in section B of the questionnaire, in order to determine the gap needed for improvement.

A7 Knowledge of performance measurement systems

Almost half of the respondents (44,1%) rate their knowledge of performance measurement systems as being between 61-80%, 26,5% rate their knowledge above 80% and only 5,9% rate their knowledge as below 41%. This perception of own knowledge of performance measurement systems can be of value in addressing the improvement gaps as indicated in section C of the questionnaire. The knowledge of performance measurement systems is tabled as follows:

	0-20%	21-40%	41-60%	61-80%	81-100%
Facility	0 (0%)	1 (3,8%)	8 (30,8%)	10 (38,5%)	7 (26,9%)
Workgroup	0 (0%)	1 (12,5%)	0 (0%)	5 (62,5%)	2 (25,0%)
Total	0 (0%)	2 (5,9%)	8 (23,5%)	15 (44,1%)	9 (26,5%)

A8 Involvement in strategic decision-making processes

The respondents' involvement in strategic decision-making processes in their organisation is reflected in the table below:

	0-20%	21-40%	41-60%	61-80%	81-100%
Facility	2 (7,7%)	3 (11,5%)	3 (11,5%)	10 (38,5%)	8 (30,8%)
Workgroup	0 (0%)	0 (0%)	0 (0%)	2 (25,0%)	6 (75,0%)
Total	2 (5,9%)	3 (8,8%)	3 (8,8%)	12 (35,3%)	14 (41,2%)

As the study population is the senior and top management of the test and evaluation facilities and SANDF and Secretariat of Defence representatives in the DERI workgroup, their involvement is evident in strategic decision-making processes, with 41,2% above 80% and 35,3% above 60%. The 14,7% respondents indicating their knowledge as being below 41% are new members or specialists on the management team of two of the facilities.

A9 Involvement in solution-finding to management challenges

As the study population plays a vital role in the success of this empirical study towards the development and implementation of an integrated service excellence model, the respondents' involvement in finding solutions to management challenges, which forms an integral part of the model, is an important element. With close to 60% of the respondents rating their involvement in management challenges as being above 80%, their input to this study is valued. The involvement of the respondents in finding solutions to management challenges is depicted in the table below:

	0-20%	21-40%	41-60%	61-80%	81-100%
Facility	2 (7,7%)	1 (3,8%)	4 (15,4%)	6 (23,1%)	13 (50,0%)
Workgroup	0 (0%)	0 (0%)	1 (12,5%)	0 (0%)	7 (87,5%)
Total	2 (5,9%)	1 (2,9%)	5 (14,7%)	6 (17,7%)	20 (58,8%)

The foregoing biographic information confirms the value of the respondents' participation in this empirical study and consequently in the development and implementation of the integrated service excellence model.

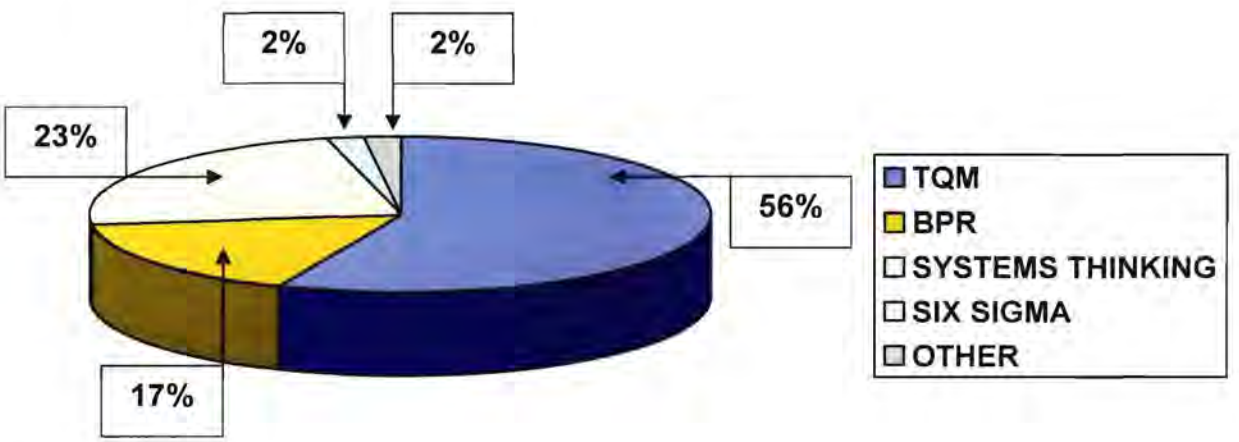
4.4.2 Section B of the questionnaire: Quality Management Approaches

In this section, the efficiency and effectiveness of the quality management approach applied in the respective test and evaluation facilities, as perceived by the respondents, are measured against specific theoretical pillars, as was discussed in chapter 2 of this thesis. This measurement is important in order to engage improvement actions in the integrated service excellence model.

B1 Quality management approaches utilised in the test and evaluation facilities

The *following* graph indicates the importance of the various quality management approaches used in the test and evaluation facilities:

Figure 4.3: Quality management approaches



The Total Quality Management (TQM) approach is regarded as the most suitable and useful approach (56% on a ranking scale indicated by the respondents), followed by the systems thinking approach (23%) and business process re-engineering (17%). A combination of the various approaches is used by most of the test and evaluation facilities; under "other" one facility indicated the development of an integrated quality management system.

B2 Commitment and leadership from top-management

Commitment and leadership from top-management were identified and described as the first steps in quality management by the antecedents of *modern* quality

management, such as Crosby (1979) (section 2.3.1.4), and echoed by modern quality specialists such as Oakland (2003) and Ross (1995) (section 2.3.2.1). The following table indicates the extent to which the quality management approach engages top-management's commitment and leadership:

Very poor	Poor	Average	Good	Excellent
0%	8,8%	14,7%	35,3%	41,2%

The indication by the respondents of excellent engagement (41,2%) from top-management in commitment and leadership towards quality management, forms a good basis on which quality can be built in the test and evaluation facilities.

B3 Quality management approach's contribution to continuous improvement of services

As the improvement of services is regarded as a continuous, incremental and progressive process by Van der Waldt (2007) (section 2.3.2.4), the quality management approach of an entity should contribute to continuous improvement of services.

The following table indicates the extent in which the quality management approach contributes to continuous improvement in the test and evaluation facilities:

Very poor	Poor	Average	Good	Excellent
0%	8,8%	11,8%	55,9%	23,5%

With 79,4% of the respondents indicating that the contribution by the quality management approach to continuous improvement services is good and excellent and 20,6% indicating it as average and poor, some effort is needed to align the quality management approach to continuous improvement as described by Harrington (1991) as well as Gerson and Gerson (2006) (section 2.3.2.3).

B4 Quality management's contribution to the "right first time" philosophy

The following table presents the extent in which quality management contributes to the "right first time" philosophy as mentioned by Crosby (1984) (section 2.3.1.4):

Very poor	Poor	Average	Good	Excellent
0%	8,8%	11,8%	64,7%	14,7%

As in the case of the previous table, which reflects continuous improvement, quality management's contribution to the "right first time" philosophy, with a 64,7% indication of good and a 8,8% indication as poor, requires effort for improvement. The adoption of the more aggressive management attitude of "do it better each time" as mentioned by Goh and Xie (1994) (section 2.3.2.1), will also create a culture of continuous improvement.

B5 Understanding and supporting customers and suppliers

The following table indicates to what extent the quality management approach understands customers and suppliers and supports the customer and supplier relationships:

Very poor	Poor	Average	Good	Excellent
0%	0%	20,6%	55,9%	23,5%

Although there were no indications of poor or very poor understanding and supporting of customers and suppliers, improvement towards the excellent category (23,5%) is needed as the customer-supplier chain forms the core of a quality management approach, as mentioned by Oakland (2003) (section 2.3.2.1).

B6 Involvement of all employees in the organisation as a team towards quality

With close to 30% of the respondents indicating that the extent to which the quality management approach involves all employees in the organisation as a team towards quality as average or poor, a special effort is needed to involve all personnel as a team towards a quality approach. The table below shows the response to the team's involvement in quality:

Very poor	Poor	Average	Good	Excellent
0%	5,9%	23,5%	58,8%	11,8%

B7 Benchmarking of organisation results against those of world leaders

The following graph represents the extent in which the quality management approach benchmarks organisation results against those of world leaders:

Figure 4.4: Benchmarking against world leaders

The respondents indicated that benchmarking of the test and evaluation facilities' performance against those facilities regarded as world leaders are poor (26,5%) and average (35,3%). A similar 35,3% of the respondents were of the opinion that the current benchmarking is good, while only 2,9% of respondents view the current benchmarking as excellent. Ross (1995) clarifies in section 2.3.2.1 the essence of benchmarking against world leaders or best-in-class organisations in order to learn how they have achieved service excellence. It might take a big effort by the test and evaluation facilities to fulfil this essential action of benchmarking, due to the uniqueness of these facilities and the difficulty in identifying the specific best-in-class organisations.

B8 Streamlining of processes and the integration of management disciplines

With close to a third (32,3%) of the respondents indicating that they do not agree that the quality management approach streamlines all processes and integrates all *management* disciplines to improve efficiency, effectiveness and adaptability, as described by Harrington (1991) (section 2.3.2.3), it is necessary to implement corrective action to achieve this goal. The following table reflects the responses:

Strongly disagree	Disagree	Don't agree or disagree	Agree	Strongly agree
2,9%	17,6%	11,8%	52,9%	14,7%

B9 Supporting of a performance measurement and control system

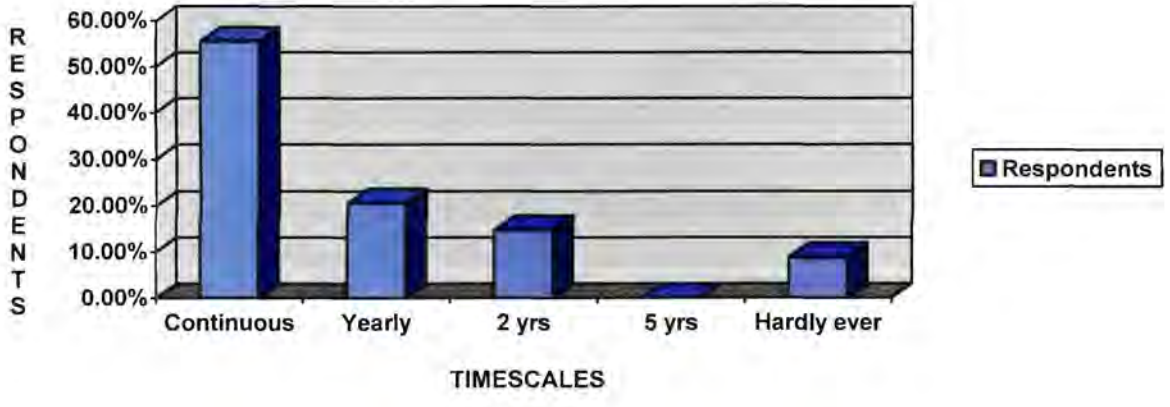
As Mosala (2007) emphasises (section 2.4.2) that effective leaders recognise the critical role of performance management, it is important that the quality management approach supports a performance measurement and control system. The table below indicates the opinion of the respondents on the statement that the organisation's quality management approach supports the implementation of a performance measurement and control system. With almost 80% agreement to the statement, the link between the quality management approach and the performance measurement and control system is evident:

Strongly disagree	Disagree	Don't agree or disagree	Agree	Strongly agree
0%	5,9%	14,7%	61,8%	17,6%

B10 Updating of products, processes and services

The following graph presents the timescale on how often the organisation's quality management approach enforces updating of products, processes and services:

Figure 4.5: Timescales on updating of products, processes and services



As Van der Waldt (2007) indicates (section 2.3.2.4) that service delivery improvement is a continuous, incremental and progressive process, the response is supportive (55,9% continuously during year and 20,6% yearly) that the quality management approach enforces updating of products, processes and services in order to qualify service delivery improvement. Only 14,7% of the respondents indicated that updating of products, processes and services occur once in two years, while 8,8% regarded

updating as hardly ever occurring. This is also supportive of Oakland's (2003) view in section 2.3.2.4 that all businesses striving towards service excellence need to update their products, processes and services periodically through invention by all members of all functions participating to reach the full potential of the system. However, corrective action is needed in those test and evaluation facilities where updating and improvement of products, processes and services are not done at least once a year.

B11 Suggestions for improvement towards quality management

The following suggestions for improvement towards quality management were made:

- More effort is required to involve all personnel in quality management. Total quality must be introduced to all levels of employees and the importance of quality management must be clearly stated, e.g. by way of posters, surveys, information sessions, etc.
- Information sessions should be used to increase the level of quality awareness at all levels, especially the lower levels.
- Compulsory reading on and familiarization with the quality system by new employees is needed.
- More focus should be put on process improvement.
- The quality management approach should improve its tools on knowledge management. Transfer and documentation of employee knowledge and capabilities through mentoring programmes or ongoing training is important. This knowledge and capability transfer should also be addressed in succession planning.
- Total quality involvement in day-to-day operations is needed. Corporate level quality approach must contribute to improvement at execution level. There is a need to integrate all organizational activities at all levels.
- Improve total commitment and work ethics regarding quality.
- Systematic implementation of a quality management system is necessary.
- Managers must be held accountable for the quality of services.
- Employees must work as an integrated team and not in silos.
- Request strategic needs from the clients on future developments to ensure that the necessary quality adjustments/requirements are attended to in order to adhere to changes in the market.

- Benchmark against emerging and established best practices internationally.
- Always strive for excellence.
- Quality must be a lifestyle.

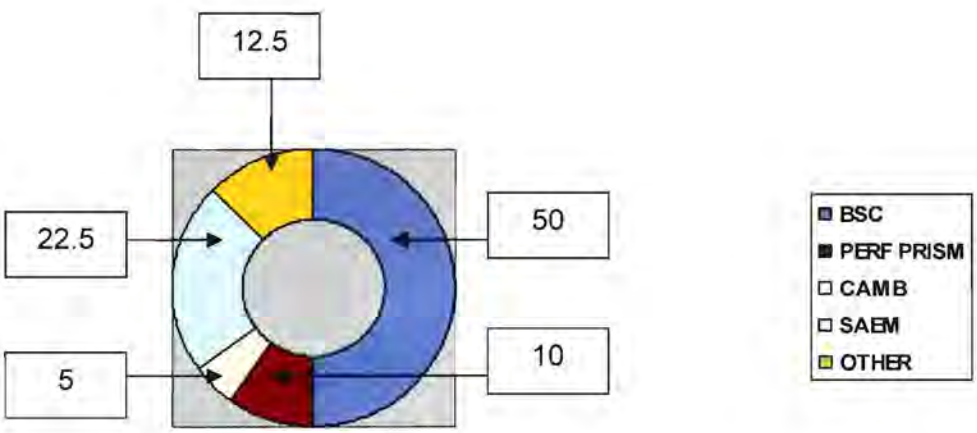
4.4.3 Section C of the questionnaire: Performance Management Systems

In this section, the performance management systems used in the test and evaluation facilities are measured against certain criteria needed for a performance management system, indicating how entities use available resources to deliver service excellence. These criteria have been discussed in section 2.4.2.

C1 Importance of performance management systems

The following graph indicates the importance of the use of the various performance management systems in the test and evaluation facilities:

Figure 4.6: Importance of performance management systems



The importance of the use of the BSC in the test and evaluation facilities is evident (50 points on a ranking scale indicated by the respondents). The "other" category in the above graph includes OTB test range's own developed unique performance management system (12,5 points). Elements of the SAEM model (22,5 points) are used by the facilities, while some criteria of the Performance Prism (10 points) and Cambridge Performance Measurement System (5 points) are also in use.

C2 Incorporation of customer requirements/needs

The following table reflects the responses to the statement that the organisation's performance management system incorporates customer requirements/needs:

Strongly disagree	Disagree	Don't agree or disagree	Agree	Strongly agree
0%	5,9%	2,9%	67,7%	23,5%

The importance of the incorporation of the customers' requirements or needs is well reflected in the more than 90% agreement by the respondents that the performance management system incorporates such requirements. Customer requirements or needs are regarded by the theorists on performance management systems (section 2.4.2) as essential for the successful design and implementation of a performance management system.

C3 Focus on strategic objectives and critical goals

For a performance management system to be effective, the performance indicators need to be linked and focused on the vision, strategic objectives and critical goals of the organisation. The statement that the organisation's performance management system focuses on strategic objectives and critical goals is well supported, as can be seen in the table below where 85,3% of the respondents indicated their agreement and only 5,9% disagree:

Strongly disagree	Disagree	Don't agree or disagree	Agree	Strongly agree
0%	5,9%	8,8%	61,8%	23,5%

C4 Visibility of the measurement process and constructive feedback

Although 55,9% of the respondents agree and 11,8% strongly agree that the organisation's performance management system offers visibility of the measurement process and gives constructive feedback, action is needed to rectify these essential criteria for performance improvement as 23,5% of the respondents are uncertain and 8,8% disagree. The following table depicts the response:

Strongly disagree	Disagree	Don't agree or disagree	Agree	Strongly agree
0%	8,8%	23,5%	55,9%	11,8%

C5 Employee's participation in the development of measurement criteria

Oakland (2003) explains (section 2.4.2) that participation in the development of measurement criteria by all employees enhances their understanding and acceptance of the measurement system, but the respondents indicated a negative situation at the test and evaluation facilities. With more than 60% of the respondents indicating an average, poor or very poor participation, a significant effort by management is needed to involve all employees in the development of measurement criteria.

The following graph reflects the extent to which the facilities' performance management systems allow employees' participation in the development of measurement criteria:

Figure 4.7: Participation in the development of measurement criteria

C6 Employee's contribution towards the needs and goals of the organisation

According to Gerson and Gerson (2006) (section 2.4.2), measurable outcomes should be established of each employee's performance and the impact thereof on the performance of the organisation. The extent in which the performance appraisal measures each employee's contribution to meeting the needs and goals of the organisation is presented in the following table:

Very poor	Poor	Average	Good	Excellent
5,9%	8,8%	29,4%	52,9%	2,9%

Although more than half of the respondents indicated that the performance appraisal measures each employee's contribution to meeting the goals and needs of the organisation effectively (52,9% and 2,9% indicated as good and excellent respectively), the 8,8% indication as poor and 5,9% indication as very poor create the need for improvement in the system to increase productivity.

C7 Integration of performance rewards with the performance management system

The 67,6% agreement of the respondents with the statement that the organisation's performance rewards, such as recognition, bonuses, merit increases and annual salary adjustments, are integrated with the organisation's performance management system, is evident in the following table:

Strongly disagree	Disagree	Don't agree or disagree	Agree	Strongly agree
5,9%	2,9%	23,5%	52,9%	14,7%

However, it is necessary for the test and evaluation facilities to improve the integration of performance rewards with performance management by using an effective performance appraisal system for staff development and career planning, as stated by Wilson (2001a) (section 2.4.2).

C8 Gap analyses between current and desired performance

Analysis of the gap between the current and desired performance of the performance management system of the test and evaluation facilities is perceived as not up to standard by the respondents, with only 47,1% agreeing and 23,5% disagreeing with the statement that the performance management system analyses the gap between the current and desired performance. The detailed response is presented in the following table:

Strongly disagree	Disagree	Don't agree or disagree	Agree	Strongly agree
2,9%	23,5%	26,5%	47,1%	0%

The above-mentioned response necessitates that the performance management systems evaluated need to be aligned with the improvement suggestions stated in the next paragraph, and incorporated in the integrated service excellence model.

C9 Suggestions for improving the performance management system

The following suggestions were made to improve the performance management system:

- Improve the involvement of employees at all levels in the development of the measurement criteria.
- Set new goals based on past performance after the obtained results.
- Employees need to envisage the link between their input and obtaining organizational objectives.
- The performance management system should be integrated with the customer satisfaction surveys where customer inputs should be considered and implemented.
- The performance measurement system should allow inputs and criteria for strategic or emerging strategy planning in the medium to long term.
- Larger differentiation should be applied in performance rewards between poor and excellent performers.
- Performance rewards against the performance management system should be better aligned.
- A more accurate definition and application of contribution performance measurement is required. (Not only bottom-line driven.)
- Realistic implementation of the system is needed with time spent on the system relevant to the time spent on the work and service delivery.
- More focus is required on outputs delivered.
- Performance appraisal must not be influenced by transformation goals and discriminating factors must be eliminated.
- Poor performance must be corrected and employees penalised.

- The performance management system should find a balance between strategic and operational goals, with the senior management level focussing more on strategic activities.
- The performance management system must integrate the organisation's goals and the performance of an individual.
- More planning and development should go into the current BSC system.
- There should be bigger focus on the strategic adjustments to be competitive in the ever-changing market.
- Corporate goals of head office should incorporate the strategic goals of the test and evaluation facilities.
- Measurement of those elements that specifically contribute to the success of the organisation should be encouraged.
- Institute quarterly performance review instead of bi-annual. Regular feedback sessions are advised between managers and employees.
- The performance management system is not flexible enough to cater for changing environments and situations and should be flexible to allow for changes at any point during a review period.
- Some indicators on the BSC need to be tailored to engineering requirements as opposed to scientific requirements.
- Develop a more applicable performance management system with the BSC as basis. The BSC is still not acceptable to many people as an open and clear system for measuring performance in the organisation.
- Motivation towards better performance is difficult in the current system as performance remuneration is decided on a level where facility management has little influence – facility management should be given more influence on performance remuneration.
- Performance rewards are based on company results and not on facility performance, which should be rectified.
- Performance management should include the measurement of intangibles, such as loyalty to the organisation, willingness to accept responsibility and reaction to new challenges.

4.4.4 Section D of the questionnaire: Challenges in obtaining Service Excellence

The importance and validity of challenges facing the test and evaluation facilities are tested against the viewpoints of the respondents in this section. The objective of the researcher is to incorporate the empirical findings on challenges in obtaining service excellence for inclusion in the integrated service excellence model.

D1 Sound corporate business practices

The test and evaluation facilities have to engage in sound public governance and corporate business practices in order to adhere to governance principles of accountability, economic prosperity, protection and sustainability of environmental resources, transparency of business management as well as the creation of confidence in government and public administration (section 3.2.1). Control over strategy and management activities is needed in order to serve the needs of stakeholders (section 3.3).

The following table indicates the response to the statement that the organisation has engaged in sound corporate business practices to ensure the above:

Strongly disagree	Disagree	Don't agree or disagree	Agree	Strongly agree
0%	5,9%	11,8%	64,7%	17,6%

The pursuit of sound business practices is evident, with 82,3% of the respondents agreeing and only 5,9% disagreeing that sound business practices are applied in serving the needs of the stakeholders.

D2 Knowledge of the King Report on Corporate Governance and the King 2 Code of Corporate Practices and Conduct

Although the vast majority of respondents indicated that the test and evaluation facilities have engaged in sound corporate business practices, the rating of the management team's knowledge of the King Report on Corporate Governance and the King 2 Code of Corporate Practices and Conduct is extremely low. This is however in contrast with the respondents' view of their own knowledge on corporate governance

as depicted in section 4.4.1, where the perception of own knowledge is much higher (30%) than the perception of the knowledge of the team.

The following table indicates that 64,7% of the respondents indicated that the management team's knowledge is between 0-40%, while only 20,5% indicated a knowledge level of above 60%:

0-20%	21-40%	41-60%	61-80%	81-100%
26,5%	38,2%	14,7%	17,6%	2,9%

In addition to the King report and practices as described by Mallin (2004) (section 3.3), the framework and objectives of governance as described by Hendrikse and Hendrikse (2004) (section 3.3) should be implemented in the facilities in order to improve management's knowledge on governance principles.

D3 Knowledge of the Public Finance Management Act (PFMA) and the National Treasury regulations

Financial accountability is governed by the PFMA, in terms of which generally recognised accounting practices, treasury norms and regulations were introduced (section 3.2.2). Such financial accountability knowledge is crucial for the test and evaluation facilities in order to ensure transparency and expenditure control.

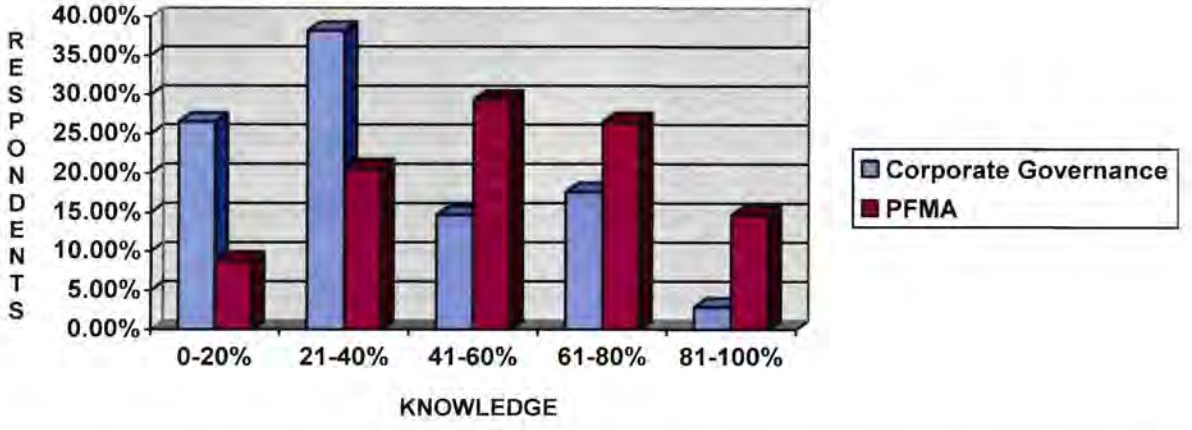
The following table is an indication of the management team's knowledge of the Public Finance Management Act (PFMA) and the National Treasury regulations:

0-20%	21-40%	41-60%	61-80%	81-100%
8,8%	20,6%	29,4%	26,5%	14,7%

With 41,2% of the respondents indicating knowledge of above 60% and close to 30% of the respondents indicating knowledge of 40% and below, training in the PFMA and Treasury regulations is needed to secure sound business practices.

Knowledge of corporate governance and the PFMA (including National Treasury regulations) can be graphically presented as follows:

Figure 4.8 Knowledge of corporate governance and the Public Finance Management Act (PFMA)



The above graph shows that there is a lack of sufficient knowledge of corporate governance principles as described in the King Report and the PFMA.

D4 In-time and accurate development of business and management information

Van der Waldt et al. (2002) emphasise (section 3.4) the recognition of sound management information for enabling the various stakeholders to fulfil their responsibilities. Key performance measures and indicators as well as the entity's actual performance against the strategic objectives and outcomes must be disclosed in the annual report. The level of success in the facilities through in-time and accurate development of business and management information, including budgets, operational plans and cash-flow forecasts, is average, with 32,4% of the respondents indicating an above 80% success rate, whilst 26,4% indicated a 60% and less success rate. Improvement on business and management information at the test and evaluation facilities is needed to ensure that all stakeholders can fulfil their responsibilities.

The following table depicts the level of success of in-time and accurate business and management information:

0-20%	21-40%	41-60%	61-80%	81-100%
5,9%	2,9%	17,6%	41,2%	32,4%

D5 Black Economic Empowerment (BEE) initiative

In the procurement of services and capital resources, the test and evaluation facilities' BEE initiative has an average success rate. More emphasis should be placed on the legislation and regulation as stipulated in the Broad-Based Black Economic Empowerment Act (section 3.4) in order to manage the facilities' empowerment progress in the various broad-based areas and to improve management's knowledge of the broad-based areas as indicated in D6.

The extent in which the facilities' BEE initiative meets the requirement that the full potential of all persons and communities in the country are exploited, is depicted in the following table where close to 60% of the respondents indicated a success rate of 60% and less, with no indication above 80%:

0-20%	21-40%	41-60%	61-80%	81-100%
0%	26,5%	32,4%	41,2%	0%

D6 Extent in which management team is conversant with the elements in the codes of good practice on BBBEE

The following table presents the extent in which the management team is conversant with the elements in the codes of good practice on BBBEE, where the majority (58,8%) is below 61%:

0-20%	21-40%	41-60%	61-80%	81-100%
5,9%	14,7%	38,2%	29,4%	11,8%

In order for the test and evaluation facilities to structure better empowerment deals and to apply the codes of good practice on BBBEE successfully, training programmes are needed to improve management teams' knowledge on the elements in the codes of good practice on BBBEE.

D7 Affirmative action measures incorporated in the Employment Equity (EE) plan

The vast majority of the respondents (82,3%) indicated that the facilities have successfully developed affirmative action measures, which were incorporated into the Employment Equity (EE) plans, in order to ensure diversity in the workplace and

harness the potential of all employees (section 3.5). These affirmative action plans and actions should be maintained to improve the under-representation of members from the designated groups.

The following table reflects the current success of the affirmative action measures of the test and evaluation facilities:

Strongly disagree	Disagree	Don't agree or disagree	Agree	Strongly agree
0%	5,9%	11,8%	58,8%	23,5%

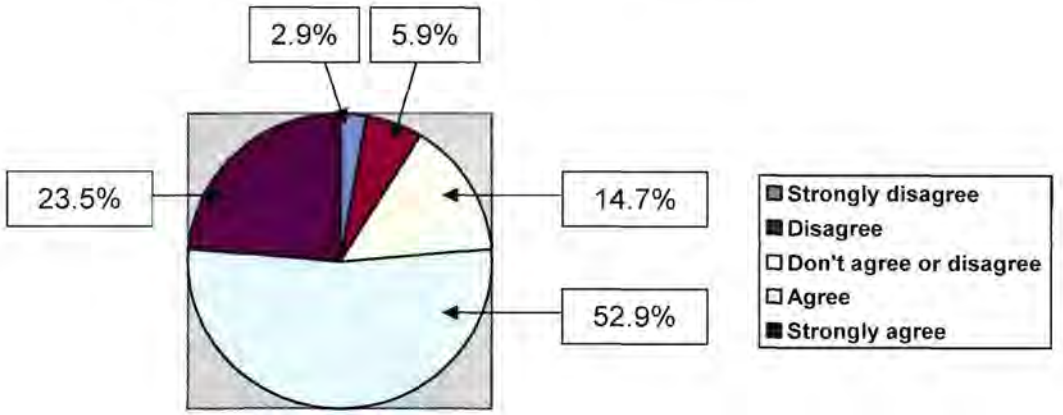
D8 Harmonious workplace relationships as part of the managing function

Carter and McMahon (2005) regard honesty, respect for each other and dignity, as well as management's professionalism and acceptance of responsibility as essential for the development of harmonious workplace relationships (section 3.5).

Harmonious workplace relationships, which are part of the managing function, create an environment that is favourable for entities to successfully address the management challenges they will experience. According to Carter and McMahon (2005), the success or failure of all other functions depends on the successful execution of the managing function.

The following graph reflects the response to the statement that "harmonious workplace relationships is a high priority in the test and evaluation facilities", where 52,9% and 23,5 % of the respondents agree and strongly agree respectively, while only 5,9% disagree and 2,9% strongly disagree with the statement:

Figure 4.9: Response to harmonious workplace relationships



Based on the above response it is clear that the test and evaluation facilities are in a strong position to address the various challenges facing management.

D9 Development of human resources to achieve competitive advantage

Future competitive advantage lies, according to Buckley and Monks (2005), in the development of the creative human capital of an organisation (section 3.5). The following table indicates the importance of the development of human resources in the facilities towards the achievement of competitive advantage. Although 67,6% of the respondents agree or strongly agree that human development plays a vital part, more should be done in terms of development and training in order to achieve competitive advantage and to address the element of skills development in the codes of good practice on BEE (section 3.4):

Strongly disagree	Disagree	Don't agree or disagree	Agree	Strongly agree
0%	8,8%	23,5%	52,9%	14,7%

D10 Safety, Health and Environmental (SHE) management principles and efforts

The extent in which SHE management principles and efforts meet the legal requirements in the test and evaluation facilities is presented in the following table:

Very poor	Poor	Average	Good	Excellent
0%	11,8%	23,5%	52,9%	11,8%

As general SHE management principles, approaches, strategies and concepts are a challenge for sustainable development in each workplace environment (section 3.6), the fact that 23,5% respondents indicated that the SHE effort is on average and 11,8% indicated that the effort is poor, urges the implementation and maintenance of these management principles and efforts.

D11 Triple bottom line success

The following table indicates to which extent the facilities meet sustainable development of economic prosperity, socio-political expectations (social wellbeing) and ecological needs in the form of a healthy environment – the so-called triple bottom line success (section 3.6):

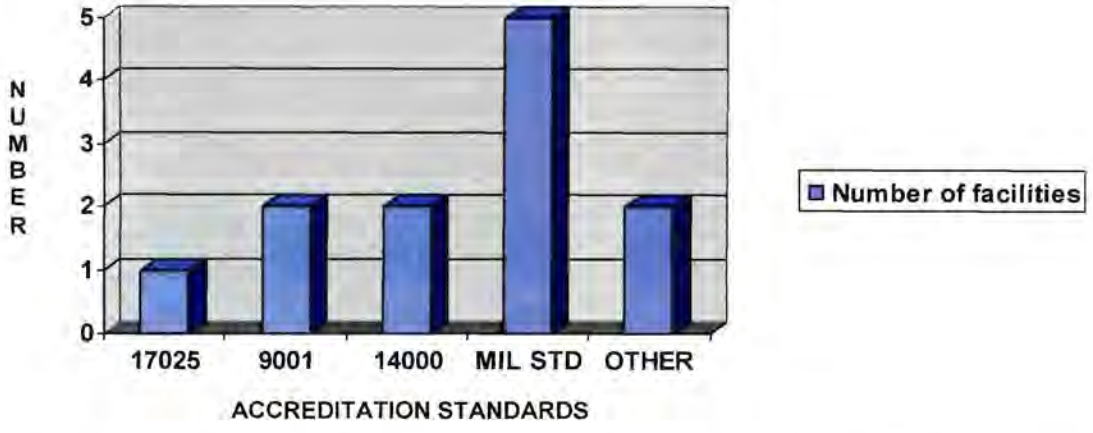
Very poor	Poor	Average	Good	Excellent
0%	14,7%	44,1%	38,2%	2,9%

The 44,1% indication of an average and 14,7% indication of a poor rating of the triple bottom line success in the facilities is of big concern as this is a general indication of sustainable development. As there is currently no benchmarking on this success rate known to the management of the facilities, a special effort is needed to establish industry norms and to improve on this perception rating on the triple bottom line.

D12 ISO or applicable standards accreditation

The following graph indicates the number of facilities accredited for the various standards:

Figure 4.10: Accreditation standards



All five test and evaluation facilities involved in this study are accredited for conducting military tests according to the military standards. The Armscor security certification requirement is indicated under "other" in the graph and applies to the facilities not residing in Armscor. Planning towards the achievement of the relevant ISO accreditation, such as ISO 14000, is needed in order to continuously improve the services of the test and evaluation facilities as measured against international norms and standards as mentioned in sections 3.6 and 3.7.

D13 Value of accreditation for the success of the organisation

The value of accreditation for the success of the test and evaluation facilities is measured against the ability to deliver efficient, effective, safe and reliable services to customers (section 3.7). It is evident in the following table that accreditation for specific standards is contributing towards the success of the facilities, with half of the respondents indicating that the value of accreditation is above 80% and no respondents indicating that the value of accreditation is below 41%:

0-20%	21-40%	41-60%	61-80%	81-100%
0%	0%	20,6%	29,4%	50,0%

D14 Comments or recommendations on service excellence

The following comments or recommendations were made on service excellence in the test and evaluation facilities:

- Increase the focus on employee, client and supplier satisfaction improvement.
- Establish and execute employee recognition for excellent service delivery, e.g. recognition on bulletin board and direct recognition for customer delight.
- Old equipment and the lagging on delivery time for new capital equipment are hampering service delivery.
- More committed workers are needed.
- Manage human resources in such a way to ensure that there are no vacancies that create a work burden on other employees, which affects their ability to focus on quality goals.
- Improve training methods and develop good mentors/trainers in order to promote good service excellence amongst the upcoming, young personnel.
- Internal customer relations between different business units within the facilities must improve.
- Participation of every employee in service delivery improvement actions is needed, and employees must exploit their full potential to the benefit of the organisation.
- Although quality is everyone's responsibility, managerial leadership and focus on quality and strategies must improve in order to enable the operational service providers to achieve service excellence.
- A 100% commitment to service excellence is needed from top management in order to lead by example. Leadership of managers plays a vital role in service excellence.
- Consistency in service delivery will enhance improved service excellence.
- A healthy environment should be created and maintained and more emphasis should be put on the management of HIV/AIDS.
- Effective command and control channels must be established where senior managers take decisions.
- Service excellence should be a key focus area in the planning and target setting of the facilities, with continuous improvement as a prime drive.
- Not all divisions are geared towards service excellence as the focus is only on compliance and not on business improvement or development.
- The compliance of all facilities with the relevant ISO accreditation is a must and the relevant accreditation standards and norms must be incorporated into one integrated quality management system.
- Extend services and/or facilities to accommodate new customer requirements and testing against new standards.

- Improve the development of measurement criteria which accurately measure the rating of service delivery, and collect suggestions or input from clients on areas to be improved on.
- It is critical to benchmark the services of the facilities in the international arena.
- All employees should understand and have the visibility of their contributions towards the objectives and eventual success or failure of the organisation.
- Service excellence must be the foundation stone of the test and evaluation facilities.

4.5 CONCLUSION

The information gathered through an interviewer-administered questionnaire was reported in this chapter, interpreted and compared with the literature study conducted in the previous chapters. The emphasis was placed on the various quality management approaches, performance management systems and challenges these facilities face in order to obtain service excellence.

The views and suggestions of the respondents contributed to addressing the research questions and to determine the gap between the theoretical pillars of service excellence and the current reality of service delivery by the test and evaluation facilities. Management tools, systems, applicable quality standards and approaches were tested through the interviewer-administered questionnaire in order to address the identified challenges these facilities have to deal with in order to obtain service excellence.

The respondents confirmed through their perceptions and views that the hypothesis of this research is true, namely that the test and evaluation facilities delivering services to the DoD do not have an integrated service excellence model in place to ensure service excellence in addressing the DoD's test and evaluation needs.

In the next chapter the main outcomes of the empirical study will be summarised and recommendations made towards the development and implementation of an integrated service excellence model.

CHAPTER 5
SUMMARY AND RECOMMENDATIONS: AN INTEGRATED SERVICE EXCELLENCE MODEL FOR STRATEGIC MILITARY TEST AND EVALUATION FACILITIES

5.1 INTRODUCTION

This study has been undertaken to address the problem of how to ensure that test and evaluation services provided by military test and evaluation facilities, governed within the public entity domain, are efficient and effective in meeting or exceeding the customer's requirements. The aim of the study has been to develop an integrated service excellence model to counter the hypothesis of the research that the test and evaluation facilities delivering test and evaluation services to the DoD do not have an integrated service excellence model in place to ensure service excellence in addressing the test and evaluation needs of the Department.

Chapter 5 makes provision for a summarised perspective on the main outcomes of the literature study and the empirical investigation, including the findings on the primary and secondary objectives. These findings, together with the literature study, form the basis on which the service excellence model was developed. The recommendations will serve as an attempt to introduce and implement the integrated service excellence model in order to obtain and continuously improve service excellence in the services provided by the strategic military test and evaluation facilities.

5.2 SUMMARY

In chapter 1 of the thesis the orientation, problem statement, research objectives, the hypothesis and the research methodology of the study were addressed. A brief overview was given of the business strategies of each of the five highly strategic military test and evaluation facilities, followed by the views of quality experts on the various quality models and approaches regarding service excellence. In the DoD's quest for the efficient management of these facilities in order to sustain long-term and cost-effective operations, the problem of how to ensure that test and evaluation services provided by these test and evaluation facilities, governed within the public entity domain, are efficient and effective in meeting or exceeding the customer's requirements, was stated. The research objectives to address the above-mentioned

problem statement and the hypothesis that the test and evaluation facilities delivering test and evaluation services to the DoD do not have an integrated service excellence model in place, were unfolded. The research methodology that was used to address the research objectives through a literature review and empirical study was mentioned. The chapter concluded with an indication of the contents of the five chapters of this research study.

The key questions of this research study were theoretically explored in chapters 2 and 3 of the thesis. Chapter 2 focussed on various quality management approaches and tools, as well as on measurement methodology, including performance measurement systems, measurement tools and techniques, in order to develop an integrated performance management system. Key concepts such as quality, quality management, TQM, continuous performance improvement, performance management, BPR, BPI and service excellence were clarified. Contributions of the antecedents to quality management, on which modern approaches to quality improvement were built, formed the basis of this chapter. Quality theorists' views on modern approaches such as TQM, systems thinking, Six Sigma and service delivery improvement were explored. Similarities and differences between the SAEM and BSC, which form the basis of the performance measurement system as part of the integrated service excellence model of the test and evaluation facilities, were summarised in this chapter.

Challenges in obtaining service excellence were covered in chapter 3. Relevant Acts and expressions, such as public and corporate governance, resource management including the PFMA and BBBEE, as well as SHE management principles and testing specifications and testing standards were conceptualised and discussed, as these have a direct impact on the services delivered by the test and evaluation facilities. It included financial challenges, human resource challenges, environmental challenges and accreditation standards to be obtained in test and evaluation services. The applicable acts and requirements within the corporate governance sphere were explored in order to align the excellence model in the provision of service excellence.

The aim of the theoretical chapters was to gain relevant information on quality management approaches and measurement systems as well as on challenges facing the test and evaluation facilities, so as to build solutions to these challenges into the integrated service excellence model and continuously improve service excellence in services provided.

In chapter 4 a detailed description was given of the research methodology used, the research design, and the way in which the data were collected, analysed and interpreted in the test and evaluation facilities, as the locus and focus of the research. The purpose of gathering the information and data from participants in the test and evaluation facilities in Armscor, Denel and the CSIR, and from participants in the DERI workgroup within the Department of Defence (SANDF and Defence Secretariat) was to develop an integrated service excellence model for the test and evaluation facilities. The aim of this empirical study was to determine to what extent the test and evaluation facilities are meeting the research objectives as covered in the previous chapters and to gather suggestions for improvement towards quality management and the performance management system as well as recommendations towards service excellence in these facilities.

Findings with regard to the primary and secondary objectives as well as the integrated service excellence model with recommendations for the implementation thereof are reported in chapter 5. These findings, collected through the theoretical study and the interviewer-administered questionnaire, are summarised in the next section.

5.3 FINDINGS WITH REGARD TO PRIMARY AND SECONDARY OBJECTIVES

With regard to the primary objective of this study, namely to develop an integrated service excellence model to obtain and continuously improve service excellence in services provided by strategic military test and evaluation facilities, thus ensuring that all activities necessary to design, develop and implement a test and evaluation service are effective and efficient, the objective was achieved. This objective was achieved by making a comparison between theory on service excellence, quality management, performance management and management perceptions, as well as the management recommendations gathered in the empirical study, and by addressing the secondary objectives, which served as input to the integrated service excellence model.

By addressing the secondary objectives the following can be regarded as the most important findings on the first objective of identifying quality management approaches and performance measurement systems to improve quality in the search for service excellence:

- A combination of quality management approaches is being used by the test and evaluation facilities (section 4.4.2), although the TQM approach, described in section 2.3.2.1, is being used by most of the facilities.
- Excellent engagement from top management in commitment and leadership towards quality management will enhance the implementation of the integrated service excellence model.
- Although the current quality management approaches deliver a fairly good contribution towards continuous improvement and the "right first time" philosophy, improvement through the integrated service excellence model towards quality management is needed to conform to the theoretical requirements on quality improvement as stated in section 2.3.2.
- Improvement in the customer-supplier chain network is needed, as this chain forms the core of a quality management approach as stated by Oakland (2003) (section 2.3.2.1).
- Greater involvement of all employees in the quality approach is needed.
- Benchmarking the test and evaluation facilities' performance against the performance and abilities of world class facilities is lacking.
- In order to improve efficiency, effectiveness and adaptability of services provided, all processes and management disciplines should be integrated in a quality model.
- There is a well-established link between the current quality management approaches and the performance measurement and control systems, with little improvement necessary.
- The BSC as performance management system is widely used in the test and evaluation facilities, albeit tailor-made at some of the facilities. Elements of the SAEM are visible at some of the facilities, whilst elements of other systems are not worth mentioning.
- Although the performance management systems focus on strategic objectives and critical goals, visibility to the measurement process and constructive feedback as well as employee's participation in the development of measurement criteria are not up to the expectations of the respondents and the theoretically explained requirements of a performance management system stated in section 2.4.2.
- Improvement with the integration of performance rewards and the performance management system is needed.

- The gap between the current and desired performance of the respective performance management systems of the facilities is perceived as too big, and improvement actions are needed to close the gap.

With regard to the second and third secondary objectives, namely to determine and explore the management challenges that the test and evaluation facilities need to address in order to obtain service excellence and to qualify the quality standards and specifications of efficiency and effectiveness, the following findings can be stated:

- Although the pursuit of sound corporate business practices is evident in the test and evaluation facilities, general knowledge of the King Report on Corporate Governance and the King 2 Code of Corporate Practices and Conduct is extremely low, while training on the PFMA and National Treasury regulations is also needed.
- Business and management information are regarded as in-time and accurate through budgets, operational plans and cash-flow forecasts and actual results.
- The success rate of the BEE initiative by the test and evaluation facilities is regarded as average, whilst knowledge on the elements of the codes of good practice on BBEE and the application of these codes needs attention.
- Employment equity is receiving the necessary attention at the facilities, focusing on diversity in the workplace and harnessing the potential of all employees.
- A culture of honesty, respect and dignity, which is essential for the development of harmonious workplace relationships as mentioned in section 3.5, should be maintained in the work force at all the facilities.
- Development of human resources to achieve competitive advantage is an ongoing process and the facilities should engage in more and ongoing training and development of employees in order to gain competitive advantage in services provided.
- SHE management principles, approaches, strategies and concepts are a challenge for sustainable development in each workplace environment, as was explained in section 3.6, and for this reason the test and evaluation facilities are urged to implement and maintain those management principles, approaches, strategies and concepts, as the current effort is not good enough or not implemented at all the facilities.

- The low indication of triple bottom line success by the respondents is of great concern as this is a general indication of sustainable development.
- As the high value of accreditation to specific standards (section 4.4.4) is contributing towards the success of test and evaluation services provided by the facilities, planning towards the achievement of the lacking ISO accreditation is needed.

In the light of the above-mentioned findings, the integrated service excellence model can now be presented in the next section.

5.4 INTEGRATED SERVICE EXCELLENCE MODEL

The researcher developed the integrated service excellence model by way of the research methodology as described in the foregoing, in order to address the primary objective of this study. Diagram 7 depicts the integrated service excellence model. It is supported by Table 7, in which the processes and elements of the model are clarified. Table 7 also serves as a checklist for the implementation of the model. The performance checklist provides an indication of the extent to which the facility is perceived to perform against the processes and elements of the integrated service excellence model. It enables management to act pro-actively on elements or processes in the model that need management intervention in order to successfully implement the integrated service excellence model. The performance checklist forms the basis from which the implementation is introduced, and ranges on a 5-point Likert-type scale as indicated in Table 7.

Information-flow between the various processes and elements of the model is crucial for the success of the model, as the impact of changes or improvements in any process or element will influence each other and the output of this integrated model. It is important that preceding processes be addressed successfully in order to secure the logical flow of the model. This implies that information on customer satisfaction or stakeholder delight should serve as input to improvement strategies or objectives that need to be built into the service operations and managed through the quality management system and finally measured by the performance management system. Striving towards service excellence through continuous improvement is an ongoing action as internal and external factors constantly influence the environment in which the test and evaluation facilities operate.

It is important to note that although Table 7 clarifies processes and elements of the model and serves as a performance checklist for its implementation, the recommendations for implementing the integrated service excellence model are set out in section 5.5.

Diagram 7: Integrated Service Excellence Model

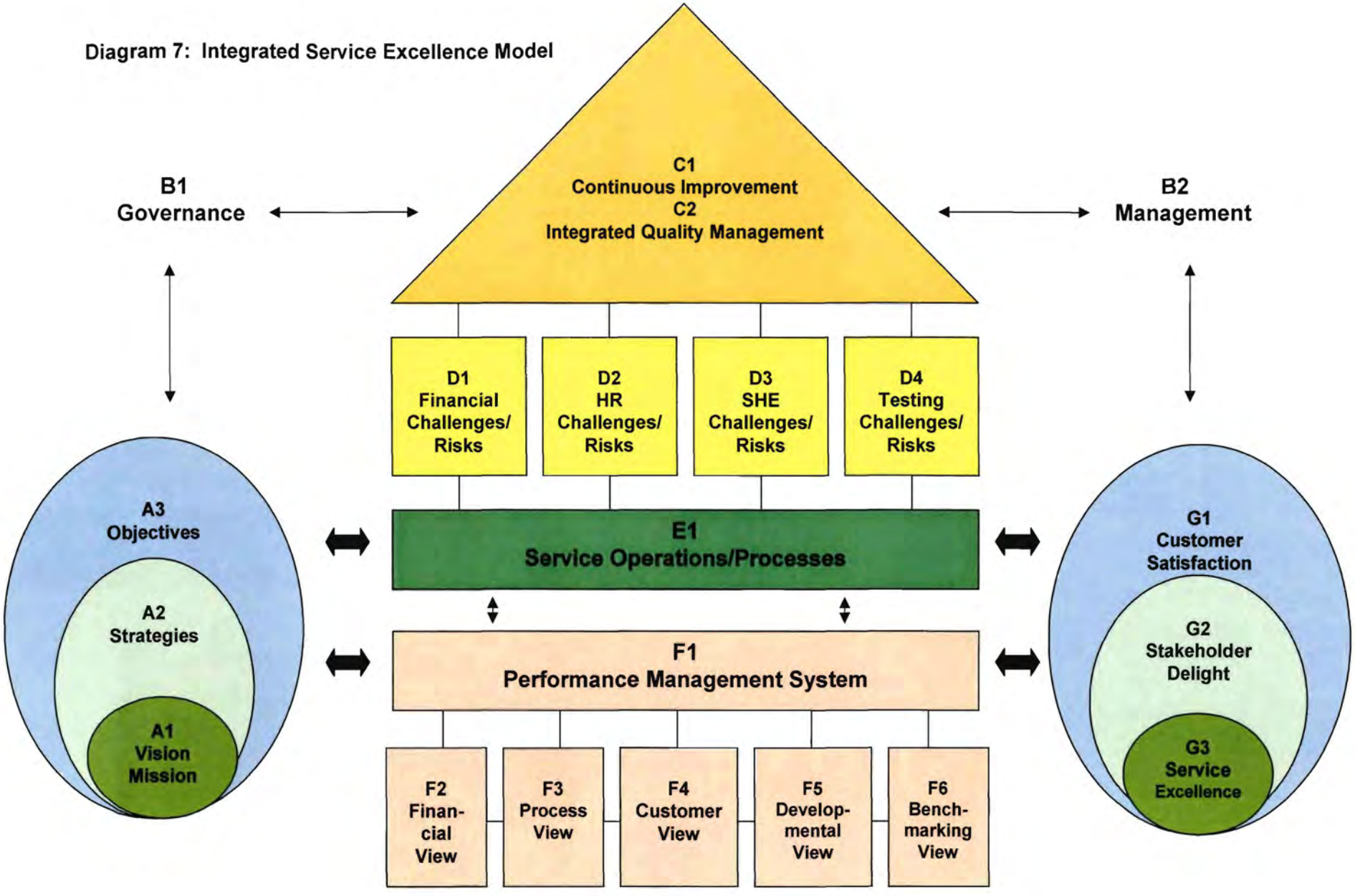


Table 7: Clarification of Integrated Service Excellence Model

Process/ Element Nr	Process/ Element Description	Clarification of Process/Element	Performance Checklist where 1=Not at all; 2=Very poor; 3=Poor; 4=Good; 5=Excellent
A1	Vision/mission	The vision and mission indicate constancy of purpose and long-term success of an organisation (Oakland, 2003 – section 2.3.2.1). A shared vision provides the focus and energy to lift an organisation out of the mundane (Senge, 1990 – section 2.3.2.2). Organisational direction is set through vision (Fontini, 2007 – section 2.3.2.4). The purpose of "good governance" is to match an organisation's vision, mission, objectives and intensions with management conduct and behaviour (Hendrikse & Hendrikse, 2004 – section 3.3). An institution's vision needs to be challenging of what is possible in the future within the boundaries of the guiding principles of public administration and management (Van der Waldt et al., 2002 – section 3.3).	To what extent does the vision and mission statement of the test and evaluation facility address the purpose and long-term success of the facility in a challenging way? ___
A2	Strategies	Strategy planning is needed for constancy of purpose and long-term success of an organisation (Oakland, 2003 – section 2.3.2.1). Management teams must understand their business strategies, product and service strategies, financial strategies and strategic plans (Duvel & Rumbel, 1998 – section 2.4.2.2).	To what extent are all strategies developed for the specific identified challenges facing the test and evaluation facility? ___ To what extent do the

Process/ Element Nr	Process/ Element Description	Clarification of Process/Element	Performance Checklist where 1=Not at all; 2=Very poor; 3=Poor; 4=Good; 5=Excellent
		Test and evaluation facilities need to develop strategies (a plan designed for a specific purpose) to address financial, human resource, SHE and testing challenges as mentioned in section 3.1.	management team and the employees understand the strategies? ___
A3	Objectives	An objective is a short-term goal that can be deduced from an organisation's mission statement and it forms the basis of performance evaluation (Van der Waldt et al., 2002 – section 3.3). Objectives or outcomes are identified in the Department's strategic plans (Van der Waldt et al., 2002 – section 3.4). The purpose of "good governance" is to match an organisation's vision, mission, objectives and intentions with management conduct and behaviour (Hendrikse & Hendrikse, 2004 – section 3.3).	To what extent are the objectives aligned with the strategies and mission of the test and evaluation facility? ___ To what extent are management conduct and behaviour successfully focussing on the objectives? ___ To what extent are the objectives being measured in the performance evaluation? ___
B1	Governance	Governance ensures that the needs of clients are served efficiently, effectively and fairly through the provision of clear processes and structures on decision-making, strategic alignment, managerial control, supervision and accountability (Deloitte, 2008 – section 3.2.1). Corporate governance deals with the fundamentals of sound corporate	To what extent is the test and evaluation facility adhering to the framework of governance as depicted in diagram 3 in section 3.3, from which governance

Process/ Element Nr	Process/ Element Description	Clarification of Process/Element	Performance Checklist where 1=Not at all; 2=Very poor; 3=Poor; 4=Good; 5=Excellent
		business practices, including accountability, sustainability and transparency of business management, and it ensures control over strategy, communication and operations in achieving corporate objectives (Corporate Governance, 2008 – section 3.2.1). Good governance institutions are accountable, effective, efficient, participatory, transparent, responsive, consensus-orientated and equitable (Good Governance, 2009 – section 3.3). Good governance is a journey and not a destination (King, 2006 – section 3.3). The results obtained in the empirical study, set out in sections 4.4.1 and 4.4.4, emphasise the need for management training on governance principles.	objectives are derived? ___ To what extent are managers and other employees enrolled for training courses on governance principles? ___
B2	Management	Management is a multi-purpose organ that manages an entity, including the work, employees and managers (Drucker, 1961 – section 1.1). Efficient management is needed to sustain long-term and cost-effective operations (SA, 2003 – section 1.2). Management is needed to constantly improve the system of production and services (Deming, 1986 – section 2.3.1.1). Management has to focus on leadership (Deming, 1986 – section 2.3.1.1).	To what extent is the management function executed that all the activities of the test and evaluation facility adhere to governance principles and address all challenges in an objective way, in order to lead the

Process/ Element Nr	Process/ Element Description	Clarification of Process/Element	Performance Checklist where 1=Not at all; 2=Very poor; 3=Poor; 4=Good; 5=Excellent
		Management has to execute activities with objectivity and integrity in order to adhere to sound governance principles (O'Donovan, 2008 – section 3.2.1).	facility to constant improvements in service delivery? ___
C1	Continuous Improvement	Service delivery improvement is a continuous, incremental and progressive process (Van der Waldt, 2007 – section 2.3.2.4). The objective of continuous process improvement is to strategically reduce variation in quality by addressing all the causes of variation in order to ensure customer satisfaction (McLaren, 2007 – section 2.3.2.3). Continuous improvement will occur through dedication and a sharing of constancy of purpose by everyone in the organisation (Flanagan and Finger, 1998 – section 1.1). Through teamwork people can grow and use all the resources effectively and efficiently to make continuous improvements (Oakland, 2003 – section 2.3.2.1). The three basic principles of continuous improvement are: focussing on the customer, understanding the processes and seeing that all employees are committed to quality and improvement actions (Oakland, 2003 – section 2.3.2.1). Continuous improvement of all processes is needed (Du Toit et al., 2002 –	To what extent are the management plans in place for continuous improvement actions on all processes in order to improve service delivery? ___

Process/ Element Nr	Process/ Element Description	Clarification of Process/Element	Performance Checklist where 1=Not at all; 2=Very poor; 3=Poor; 4=Good; 5=Excellent
		section 2.3.2.1). The demand for training and development within organisations will increase in order to fulfil continuous improvement initiatives (Monat, 2001 – section 3.5). Some effort is needed to conform the quality management approach of the test and evaluation facilities towards continuous improvement, as indicated in the empirical study – section 4.4.2.	
C2	Integrated Quality Management	Integrated quality management incorporates various quality management models, tools and approaches in a system to improve quality – section 4.1. Integrated quality management aims at embedding awareness of quality, not only in all organisational processes but also in the total supply chain and life cycle of the product or service, as is the case with TQM (Total Quality Management, 2008 – section 2.2.2). The greatest value to be obtained by an organisation is to use the entire family of quality standards in an integrated manner (Hoyle, 2006 – section 3.7). Total quality management aims at long-term success through customer satisfaction and benefits to all employees – section 2.2.2.	To what extent does the integrated quality management system address all services provided in a quality-centred approach, aiming at long-term success through customer satis-faction and benefits to all employees? ___

Process/ Element Nr	Process/ Element Description	Clarification of Process/Element	Performance Checklist where 1=Not at all; 2=Very poor; 3=Poor; 4=Good; 5=Excellent
D1	Financial Challenges/ Risks	Financial accountability is legislated by the PFMA; the vision of the PFMA is unqualified consolidated financial statements, to emphasise the importance of good management and accountability as well as the recognition of sound management information for enabling the various stakeholders to fulfil their responsibilities (Van der Waldt et al., 2002 – section 3.4). The success of each organisation is engaged in the in-time and accurate producing of operating plans, budgets and cash-flow forecasts (Hendrikse & Hendrikse, 2004 – section 3.4) as well as a risk management plan, fraud prevention plan, asset and liability plan and capital expenditure programmes (SA, 2006 – section 3.4). Management of the facilities' empowerment progress in the various broad-based areas as stipulated in the Broad-Based Black Economic Empowerment Act – section 3.4. Effective controls must encompass the applicable laws, plans and actions, and be executed through internal audits (SA, 2006 – section 3.4). There is a need for effective strategies and objectives for growth, profitability and productivity to enhance stakeholder and economic value (Kaplan & Norton, 2001 – section 2.4.2.2).	To what extent are the financial challenges and risks addressed in the relevant strategies and plans as required by law and stakeholder expectations? ___

Process/ Element Nr	Process/ Element Description	Clarification of Process/Element	Performance Checklist where 1=Not at all; 2=Very poor; 3=Poor; 4=Good; 5=Excellent
		Improvement of management's knowledge on the broad-based areas of BBBEE and the PFMA and Treasury to secure sound business practices – section 4.4.4.	
D2	HR Challenges/ Risks	Government's intervention in HR challenges is imbedded in the Employment Equity Act, 1998 and updated with the Code of Good Practice regarding preparation, implementation and monitoring of Employment Equity plans (EE plans) (Employment Equity Act, 1998 – section 3.5). The EE plans of the test and evaluation facilities should be maintained to improve the under-representation of members of the designated groups – section 4.4.4. Challenges and risks within human resources revolve around the functions of management, people, performance and development (Diagram 5 – section 3.5). The development of harmonious workplace relationships is needed where responsibility acceptance by employees guided by professionalism from management and values such as honesty, respect and dignity are evident (Carter & McMahon, 2005 – sections 3.5 and 4.4.4). The foundation for assessing and fulfilling the personnel needs of an organisation lies in job analysis and selection methods (Hoffmann, 2001 –	To what extent are the human resource challenges and risks addressed in the relevant strategies and plans as required by law and stakeholder expectations? ___

Process/ Element Nr	Process/ Element Description	Clarification of Process/Element	Performance Checklist where 1=Not at all; 2=Very poor; 3=Poor; 4=Good; 5=Excellent
		section 3.5). Successful recruitment leads not only to a better quality of work life for employees but also to improved productivity in the organisation (Wilson, 2001b – section 3.5). Training and development of personnel within organisations will increase in order to fulfil continuous improvement initiatives (Monat, 2001 – section 3.5).	
D3	SHE Challenges/ Risks	General SHE management principles, approaches, strategies and concepts are challenges for sustainable development in each organisation. External factors such as environmental regulations, as well as internal factors such as the sensitivity of the general public (including the employees) to environmental issues, are forces that require an organisation to develop an environmental management system (Clements, 1996 – section 3.6). Human capital is managed through the OHS management system embedded in the OHSAS 18001 Standard as well as through environmental management embedded in the ISO 14001 Standard (SHE Management Systems, 2008 – section 3.2.3). Occupational Health and Safety (OHS) is a cross-disciplinary area	To what extent are the SHE strategies and action plans to improve sustainable development of economic prosperity, socio-political expectations (social well-being) and ecological needs (healthy environment) in place to be implemented? ___

Process/ Element Nr	Process/ Element Description	Clarification of Process/Element	Performance Checklist where 1=Not at all; 2=Very poor; 3=Poor; 4=Good; 5=Excellent
		concerned with protecting the safety, health and welfare of employers, employees and co-workers that are engaged in work or employment, as well as family members, customers, suppliers, nearby communities and other members of the public who are impacted by the workplace environment (North-West University, 2007 – section 3.6). An environmental management system (EMS) is a comprehensive, well-documented and structured approach addressing regulatory, corporate and customer requirements relating to environmental issues (Clements, 1996 – section 3.6). As test and evaluation facilities' SHE effort is perceived as poor by the respondents (section 4.4.4), the implementation and maintenance of SHE management principles and efforts are critical.	
D4	Testing Challenges/ Risks	Safe and reliable goods and services are safeguarded by testing services provided against international and specific test standards and specifications (Armscor, 2008a – section 3.2.4). The purpose of the ISO family is to assist organisations to operate effective quality management systems by providing an equitable basis for assessing the capability of organisations to meet customer and applicable regulatory requirements (Hoyle, 2006 – section 3.7).	To what extent are plans of action in place to achieve the lacking ISO accreditation and other standards? ___ To what extent are action plans in place for maintaining the current accreditation standards? ___

Process/ Element Nr	Process/ Element Description	Clarification of Process/Element	Performance Checklist where 1=Not at all; 2=Very poor; 3=Poor; 4=Good; 5=Excellent
		In the quest towards continuous improvement, test and evaluation facilities must continually improve the effectiveness of their management system through the use of the quality policy, quality objectives, audit results, data analysis, corrective and preventative actions and management review as described by the ISO standards (section 3.7) and the urge for improvement as indicated in section 4.4.4.	
E1	Service Operations/ Processes	Service operational excellence is achieved by improving supply-chain management, asset utilisation, resource-capacity management and all other internal processes (Kaplan & Norton, 2001 – section 2.4.2.2). Quality awareness is needed in all organisational processes as well as in the total supply chain and life cycle of the product or service (Total Quality Management, 2008 – section 2.2.2). A systematic approach is needed to align the business processes in order to realise the organisation's goals (Harrington, 1991 – section 2.2.4). Processes must be effective in order to produce the desired results; processes must be efficient by minimising the resources used; and processes must be adaptable to changing customer and business needs (Harrington, 1991 – section 2.3.2.3). Improvement in processes is needed to control in-process performance; to	To what extent are plans of action in place to update and improve processes and test and evaluation services executed in the operational phase? ___

Process/ Element Nr	Process/ Element Description	Clarification of Process/Element	Performance Checklist where 1=Not at all; 2=Very poor; 3=Poor; 4=Good; 5=Excellent
		eliminate waste and rework; to eliminate activities that do not add value to the product or service, and to eliminate non-conformities in all phases of work (Besterfield et al., 2003 – section 2.3.2.3). Corrective action is needed to streamline all processes and to integrate all management disciplines with a view to improving efficiency, effectiveness and adaptability in service operations (section 4.4.2).	
F1	Performance Management System	A performance management system clearly demonstrates how entities use available resources to deliver on their mandate by the following indicators: economy - determining whether specific inputs are acquired at the lowest cost and right time; efficiency - determining how productively inputs are translated into outputs; effectiveness - determining to which extent the outputs achieve the desired outcomes; and equity – determining whether services are being provided impartially, fairly and equitable (SA, 2007a – section 2.4.2). A performance management system must be designed, planned and implemented to reflect customer requirements, give visibility to the processes and the progress made, communicate the total quality effort and engage the never-ending improvement cycle (Oakland, 2003 – section 2.4.2) and be measured (section 4.4.3) to indicate how the test and	To what extent does the performance management system focus on critical goals that bring visible progress on and enhancement of how the facility uses available resources to deliver service excellence? ___

Process/ Element Nr	Process/ Element Description	Clarification of Process/Element	Performance Checklist where 1=Not at all; 2=Very poor; 3=Poor; 4=Good; 5=Excellent
		evaluation facilities are using available resources to deliver service excellence.	
F2	Financial View	The financial view indicates what an organisation is achieving in relation to its overall planned business objectives and in satisfying the needs and expectations of each stakeholder with financial interest (SAEF, 2000 – section 2.4.2.1). The strategy and objectives for growth, profitability and productivity to enhance stakeholder value are included in the financial perspective. Economic value through revenue growth by increasing new markets, new products, new customers and the increase in sales to existing customers by deepening relationships with them is measured in this view. Economic value through higher productivity, which can be achieved through lowering direct and indirect expenses and the utilisation of assets more efficiently, are also measured in the financial view (Kaplan & Norton, 2001 – section 2.4.2.2).	To what extent are the financial indicators impacting on financial stability measured in the financial view? ___
F3	Process View	Process view indicates how an organisation identifies, manages, reviews and improves the processes by which it operates (SAEF, 2000 – section 2.4.2.1). The process view derives from the business processes that have the	To what extent are the processes impacting on operational excellence measured in the process view? ___

Process/ Element Nr	Process/ Element Description	Clarification of Process/Element	Performance Checklist where 1=Not at all; 2=Very poor; 3=Poor; 4=Good; 5=Excellent
		biggest impact on customer satisfaction (Duvel & Rumble, 1998 – section 2.4.2.2). Service operations are measured through the process view in order to strive towards operational excellence (Kaplan & Norton, 2001 – section 2.4.2.2).	
F4	Customer View	Customer view determines the satisfaction level of customers by addressing and measuring the fulfilment of the needs, requirements and expectations of the customers. It indicates the level of customer satisfaction an organisation is achieving by its products, services and customer relationships, including the number of complaints and the number of new or lost clients (SAEF, 2000 – section 2.4.2.1). The following criteria, which should be measured in the customer view, influence the customers' perception of an organisation: time in which development and services take place, the quality of products and services, the value-added services an organisation supplies, and the total cost of offering a product or service (Duvel & Rumbel, 1998 – section 2.4.2.2).	To what extent do all critical criteria determine the customers' satisfaction level covered in the customer view? ___
F5	Developmental View	Future competitive advantage lies in the development of the human capital of an organisation (Buckley & Monks, 2005 – section 3.5). Developmental view indicates the development and training achievements	To what extent is the investment in employees measured in the developmental view to ensure

Process/ Element Nr	Process/ Element Description	Clarification of Process/Element	Performance Checklist where 1=Not at all; 2=Very poor; 3=Poor; 4=Good; 5=Excellent
		of human resources in order to gain competitive advantage and to address the element of skills development in the codes of good practice on BEE (SA, 2007b – section 3.4). Developmental view indicates how an organisation releases the full potential of its people by how people capabilities are sustained and developed and how people are involved, enabled, empowered and recognised (SAEF, 2000 – section 2.4.2.1). Learning and growth are regarded as the foundation of any strategy (Kaplan & Norton, 2001 – section 2.4.2.2).	improvement in skills, in order to lead to improved operating efficiencies and customer satis-faction? ___
F6	Benchmarking View	The essence of benchmarking is to continuously compare a company's strategy, products and processes with those of world leaders and best-in-class companies in order to learn how they have achieved service excellence (Ross, 1995 – section 2.3.2.1). Benchmarking measures an organisation's operations, products and services against those of its competitors in order to continuously identify, understand and adapt best practices and processes that will lead to superior performance (Oakland, 2003 – section 2.4). It might take a big effort by the test and evaluation facilities to fulfil this essential action of benchmarking due to the uniqueness of these facilities	To what extent are best practices and best-in-class organisations identified and measured against in the benchmarking view? ___

Process/ Element Nr	Process/ Element Description	Clarification of Process/Element	Performance Checklist where 1=Not at all; 2=Very poor; 3=Poor; 4=Good; 5=Excellent
		and difficulty to identify the specific best-in-class organisations (section 4.4.2).	
G1	Customer Satisfaction	The performance management system should be integrated with the customer satisfaction surveys where customer inputs should be considered and implemented (section 4.4.3). Customer satisfaction refers to Customer View (F4) above for detailed measurement.	To what extent is a customer satisfaction survey implemented? ___ To what extent was the overall goal on the customer satisfaction level reached during the review period? ___
G2	Stakeholder Delight	Sound management information is needed to enable the stakeholders to fulfil their responsibilities (Van der Waldt et al., 2002 – section 3.4). The protection of stakeholder interests is imbedded in sound organisational governance (Fontini, 2007 – section 2.3.2.4). Effective relationships with stakeholders are a necessity for operational excellence (Kaplan & Norton, 2001 – section 2.4.2.2). A balanced view of an organisation's position on non-financial as well as financial matters should be communicated to all the stakeholders (Mallin, 2004 – section 3.3). Stakeholder delight measures the satisfaction level of all stakeholders	To what extent are measurement surveys implemented to determine stakeholder delight? ___ To what extent was the overall goal on the stakeholder delight level reached during the review period? ___

Process/ Element Nr	Process/ Element Description	Clarification of Process/Element	Performance Checklist where 1=Not at all; 2=Very poor; 3=Poor; 4=Good; 5=Excellent
		(SAEF, 2000 – section 2.4.2.1).	
G3	Service Excellence	Service excellence can be seen as a way of working and a way of interacting and working together with others, not only as a "good" attitude but as a "great" one (Service Excellence, 2008 – section 2.2.5). Adhering to the ten commandments for service excellence, as introduced by Shonhiwa (2001) (section 2.3.2.4), is a "great attitude". The primary objective of this study was to develop an integrated service excellence model to obtain and continuously improve service excellence in services provided by strategic military test and evaluation facilities (section 1.4.1).	To what extent has the test and evaluation facility implemented the integrated service excellence model (six months after date of implementation)? ___

5.5 RECOMMENDATIONS FOR IMPLEMENTING THE INTEGRATED SERVICE EXCELLENCE MODEL

The following recommendations can be made for implementing the integrated service excellence model in order to obtain and continuously improve service excellence in services provided by the strategic military test and evaluation facilities to the DoD:

- Systematic implementation of the integrated service excellence model (Diagram 7 and Table 7) at all the test and evaluation facilities.
- Involvement of all personnel in the implementation and operation of the model.
- Detailed explanation of all the theoretical pillars, systems, processes and elements in the model through introductory training sessions.
- Sharing of the practical suggestions or recommendations for improvement towards service excellence by the respondents in this study (section 4.4) with all employees.
- The development, training and mentoring of "champions" on specific systems or elements in the model, such as the developers of strategies and objectives, benchmarking specialists, quality management specialists, performance management specialists, corporate governance specialists and liaison specialists with shareholders, customers and employees.
- In order to fulfil the above-mentioned recommendations, a detailed project plan for the implementation and operation of the integrated service excellence model is needed.
- As a future project this integrated service excellence model needs to be programmed as an integrated computerised system in order to achieve effective and efficient use in the operational application of the model. Funding for such a project should be negotiated through the Secretariat of Defence by means of the Medium Term Expenditure Framework.

The above-mentioned recommendations will contribute to ensure that all activities necessary to design, develop and implement a test and evaluation service are effective and efficient.

5.6 FINAL CONCLUSION

Through this research study it was possible to develop an integrated service excellence model for implementation in the strategic military test and evaluation facilities delivering test and evaluation services to the DoD and more specifically to the SANDF. The integrated service excellence model addresses the DoD's needs and constitutional obligations as mandated by the Constitution of the Republic of South Africa (Act 108 of 1996), the Defence Act (Act 42 of 2002), the White Paper on National Defence for the Republic of South Africa (1996) and the Defence Review (1998).

The research objectives were reached through the evaluation done on quality models and approaches presented by quality theorists in order to develop the most effective and efficient model to deliver services. Governance and management principles were incorporated in the service excellence model in order to adhere to the laws and policies directing and guiding the functions of the DoD and the military test and evaluation facilities that form part of the defence-related industries.

The empirical findings enabled the researcher to establish the current reality of services delivered by the test and evaluation facilities, and to determine the gap between existing services against expected services and the theoretical requirements for service excellence. The engagement of top and senior management in commitment and leadership towards quality management and governance principles will enhance the implementation of the integrated service excellence model at the facilities.

Although this integrated service excellence model was developed for and within the test and evaluation facilities, it is the opinion of the researcher that application of the model is viable for other service delivery departments in Government or organisations in the public and private sector, with the exception of the testing specification elements, standards and risks, which could be replaced by the specific service delivery specifications for those organisations.

It is the wish and prayer of the researcher that this integrated service excellence model will have a great impact and positive influence on services delivered by the military test and evaluation facilities.

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QUESTIONNAIRE NUMBER | | | (1-2)

QUESTIONNAIRE TO SENIOR MANAGEMENT IN THE TEST AND EVALUATION FACILITIES AND WORKGROUP IN THE DEPARTMENT OF DEFENCE

The purpose of this questionnaire is to gather information and data from participants in the test and evaluation facilities within Armscor, Denel and the CSIR as well as participants in the DERI workgroup within the Department of Defence (SANDF and Defence Secretariat) in order to develop an integrated service excellence model for the Test and Evaluation Facilities. The questionnaire will be used to conduct a standardised interview with the mentioned participants on senior and top management level.

SECTION A: BIOGRAPHIC INFORMATION

Mark with an X in the appropriate block

1. State your position

Employee of Test and Evaluation Facilities	Participant in DERI Workgroup

(3)

2. Years experience in government departments and/or public entities

1- 5 years	6-10 years	11-16 years	17-24 years	25 + years

(4)

3. Years experience in military test and evaluation activities

1- 5 years	6-10 years	11-16 years	17-24 years	25 + years

(5)

4. Years experience in commercial test and evaluation activities

1- 5 years	6-10 years	11-16 years	17-24 years	25 + years

(6)

5. Rate your knowledge of corporate and public governance principles

0-20%	21-40%	41-60%	61-80%	81-100%

(7)

6. Rate your knowledge of quality management systems

0-20%	21-40%	41-60%	61-80%	81-100%

(8)

7. Rate your knowledge of performance measurement systems

0-20%	21-40%	41-60%	61-80%	81-100%

(9)

8. State your involvement in strategic decision-making processes

0-20%	21-40%	41-60%	61-80%	81-100%

(10)

9. State your involvement in solution-finding to management challenges

0-20%	21-40%	41-60%	61-80%	81-100%

(11)

Mark with an X according to the given scale where applicable

SECTION B: QUALITY MANAGEMENT APPROACHES

1. Indicate the importance of the quality management approach utilised in your organisation on a scale from 1 (= less important) to 5 (= most important)

Model/Approach	Ranking				
	1	2	3	4	5
Total Quality Management (TQM)					
Business Process Re-engineering (BPR)					
Systems Thinking approach					
Six Sigma approach					
Other quality management approaches (specify)					

(12)

2. To what extent does your quality management approach engage commitment and leadership from top management?

Very poor	Poor	Average	Good	Excellent

(13)

3. To what extent does your quality management approach contribute to continuous improvement?

Very poor	Poor	Average	Good	Excellent

(14)

4. To what extent does your quality management approach contribute to the "right first time" philosophy?

Very poor	Poor	Average	Good	Excellent

(15)

5. To what extent does your quality management approach understand customers and suppliers and support the customer and supplier relationships?

Very poor	Poor	Average	Good	Excellent

(16)

6. To what extent does your quality management approach involve all employees in the organisation as a team towards quality?

Very poor	Poor	Average	Good	Excellent

(17)

7. To what extent does your quality management approach benchmark organisation results against those of world leaders?

Very poor	Poor	Average	Good	Excellent

(18)

8. Your organisation's quality management approach streamlines all processes and integrates all management disciplines to improve efficiency, effectiveness and adaptability

Strongly disagree	Disagree	Don't agree or disagree	Agree	Strongly agree

(19)

9. Your organisation's quality management approach supports the implementation of a performance measurement and control system

Strongly disagree	Disagree	Don't agree or disagree	Agree	Strongly agree

(20)

10. How often does your organisation's quality management approach enforce updating of products, processes and services?

Continuously during year	Once a year	Once in two years	Once in five years	Hardly ever

(21)

11. Suggest any improvement towards your organisation's quality management approach

_____

_____

_____

Mark with an X according to the given scale where applicable

SECTION C: PERFORMANCE MANAGEMENT SYSTEMS

1. Indicate the importance of the performance management system utilised in your organisation on a scale from 1 (= less important) to 5 (= most important)

Systems	Ranking				
	1	2	3	4	5
Balanced Scorecard (BSC)					
Performance Prism					
Cambridge Performance Measurement System					
South African Excellence Model (SAEM)					
Other performance management systems (specify)					

(22)

2. Your organisation's performance management system incorporates customer requirements/needs

Strongly disagree	Disagree	Don't agree or disagree	Agree	Strongly agree

(23)

3. Your organisation's performance management system focuses on strategic objectives and critical goals

Strongly disagree	Disagree	Don't agree or disagree	Agree	Strongly agree

(24)

4. Your organisation's performance management system offers visibility to the measurement process and gives constructive feedback

Strongly disagree	Disagree	Don't agree or disagree	Agree	Strongly agree

(25)

5. To what extent does your performance management system allow employee's participation in the development of measurement criteria?

Very poor	Poor	Average	Good	Excellent

(26)

6. To what extent does your performance appraisal measure each employee's contribution to meet the needs and goals of the organisation?

Very poor	Poor	Average	Good	Excellent

(27)

7. Your organisation's performance rewards, such as recognition, bonuses, merit increases and annual salary adjustments are integrated with your organisation's performance management system

Strongly disagree	Disagree	Don't agree or disagree	Agree	Strongly agree

(28)

8. Your organisation's performance management system analyses the gap between the current and desired performance

Strongly disagree	Disagree	Don't agree or disagree	Agree	Strongly agree

(29)

9. Suggest any improvements towards your organisation's performance management system

_____

_____

_____

Mark with an X according to the given scale where applicable

SECTION D: CHALLENGES IN OBTAINING SERVICE EXCELLENCE

1. Your organisation has engaged in sound corporate business practises to ensure control over strategy and management activities in order to serve the needs of stakeholders

Strongly disagree	Disagree	Don't agree or disagree	Agree	Strongly agree

(30)

2. Rate your management team's knowledge of the King Report on Corporate Governance as well the King 2 Code of Corporate Practises and Conduct

0-20%	21-40%	41-60%	61-80%	81-100%

(31)

3. Rate your management team's knowledge of the Public Finance Management Act (PFMA) and the National Treasury regulations

0-20%	21-40%	41-60%	61-80%	81-100%

(32)

4. Rate your organisation's success through in time and accurate development of business and management information including budgets, operational plans and cash-flow forecasts

0-20%	21-40%	41-60%	61-80%	81-100%

(33)

5. To what extent does your organisation's Black Economic Empowerment (BEE) initiative meet the requirement that the full potential of all persons and communities in the country are exploited?

0-20%	21-40%	41-60%	61-80%	81-100%

(34)

6. To what extent is your management team conversant with the elements in the codes of good practise on BBBEE?

0-20%	21-40%	41-60%	61-80%	81-100%

(35)

7. Your organisation has successfully developed affirmative action measures which are incorporated in the Employment Equity (EE) plan in order to ensure diversity in the workplace and harnesses the potential of all employees

Strongly disagree	Disagree	Don't agree or disagree	Agree	Strongly agree

(36)

8. Harmonious workplace relationships including honesty, respect and dignity as well as professionalism from management and responsibility acceptance are a high priority in your organisation

Strongly disagree	Disagree	Don't agree or disagree	Agree	Strongly agree

(37)

9. The development of human resources in your organisation plays an important role in achieving competitive advantage

Strongly disagree	Disagree	Don't agree or disagree	Agree	Strongly agree

(38)

10. To what extent does your organisation's SHE management principles and efforts meet the legal requirements?

Very poor	Poor	Average	Good	Excellent

(39)

11. To what extent does your organisation meet sustainable development of economic prosperity, socio-political expectations (social wellbeing) and ecological needs in the form of a healthy environment (triple bottom line success)?

Very poor	Poor	Average	Good	Excellent

(40)

12. Indicate what ISO Standards or other applicable standards your organisation has been accredited for

Standards	Accreditation
ISO 17025	
ISO 9001	
ISO 14000	
RSA Military Standards	
Other standards (specify)	

(41)

13. Indicate the value of your organisation's accreditation towards the success of the organisation

0-20%	21-40%	41-60%	61-80%	81-100%

(42)

14. Any comments or recommendations on service excellence in your organisation

_____

_____

_____

THANK YOU FOR YOUR CO-OPERATION