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Organisational transformation using total quality management and ISO 9000

Percival Mvuyisi Nabe
Cape Peninsula University of Technology

ORGANISATIONAL TRANSFORMATION USING TOTAL QUALITY MANAGEMENT AND ISO 9000

By

Percival Mvuyisi Nabe

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Supervisor: Prof. Dr. J A Watkins

Bellville

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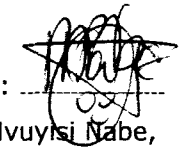
DECLARATION

"I Percival Mvuyisi Nabe, hereby declare that the contents of this dissertation submitted for the degree Magister Technologiae at the Cape Peninsula University of Technology, represent my own original unaided work, and that the dissertation has not previously been submitted to any other institution of higher education towards any qualification. I further declare that all sources cited or quoted are indicated and acknowledged by means of a comprehensive list of references. Further more, it represents my own opinions and not necessarily those of the Cape Peninsula University of Technology.

Signature: 

Percival Mvuyisi Nabe,

October 21st, 2008

DEDICATION

"If you develop the habits of success, you will make success a habit"

Anonymous

"Never let your fears stop you from flying; you'll never reach your height"

Anonymous

"This study is dedicated to all positive, ambitious, diligent patriots who are determined in making a difference in this country. The author believes that talented individuals owe it to Almighty God. This study is also dedicated to my partner who supports me through thick and thin: she never gives up.

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My mother for the values and principles she taught me as a young boy especially independence and for kick starting my studies. She should be proud of the man I turned out to be.

SA Five Engineering for making available their facilities to enable me to conduct the research.

ABSTRACT

Author:	Percival Mvuyisi Nabe
	Bachelor's Degree in Mechanical Engineering
	Bachelor's Degree in Quality Management
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Engineering by its very nature is associated with quality processes. Ineffective processes have the potential to jeopardize the chances of providing consistently, products that meet customer and applicable regulatory requirements. By implication, this senario also calls for organizational transformation. SA Five Engineering (Pty) Ltd (SAF), which will serve as the target organization for this research study has in the past year suffered numerous complaints of poor products as a result of ineffective processes, impacting on production quality. Both ISO 9000 and the concept of Total Quality Management have the potential to mitigate ineffective processes within SAF.

The key research objective with this research study, is to recommend how to improve ineffective processes and the competitive advantage of SAF through improved products. Furthermore, to analyze the business organization in order to determine the extent to which Total Quality Management principles are deployed with the aim of developing a model, which will serve as a benchmark for sustained improvement. The research problem deals with ineffective processes within SAF which impacts adversely on delivery of quality products and services.

The research design and methodology to be conducted within the ambit of this research study is applied research, as applied research is designed to apply its findings to solve a specific existing problem. The research will

furthermore fall in the social world as the research relates to a structured business research study pertaining to how things are, and why. The research will be conducted from both an empirical and theoretical research paradigm, using a survey for the purpose of data collection. The research method that will be applied within the context of this research study will be a case study research.

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GLOSSARY OF TERMS

- **Total Quality Management:** It is a management approach originated in Japan during the 1950's. Hashmi (2000:**O**nline) discuss TQM as a management philosophy that seeks to integrate all organisational functions (marketing, finance, design, engineering, and production, customer service, etc.) to focus on meeting customer needs and organizational objectives aimed at increasing business and reducing losses due to wasteful practices.

- **ISO 9000:** ISO based in Geneva, Switzerland, was established in 1947, as a non-governmental organisation to harmonize dozens of national and international standards relating to quality and it is a worldwide federation of national standards organizations. Goetsch and Davis (2002:7), define ISO 9000 as an international set of five related standards for qualification of global quality assurance and quality control standards specifying quality management system requirements to demonstrate an organization's ability to consistently provide products that meets customer and applicable regulatory requirements.

- **Conformity:** Conformity is all about meeting requirements. ISO 9001 2000 lists many quality system requirements. If an organization meets these requirements, it conforms to these requirements (Praxiom Research Group Limited, 2006:**O**nline).

- **Continual improvement:** Continual improvement is a set of activities that an organization routinely carries out in order to enhance its ability to meet requirements. Continual improvement can be achieved by carrying out internal audits, performing management reviews, analyzing data, and implementing corrective and preventive actions (Praxiom Research Group Limited, 2006:Online).

- **Corrective actions (CA):** Corrective actions are steps that are taken to remove the causes of an existing nonconformity or to make quality improvements. Corrective actions address actual problems. In general, the corrective action process can be thought of as a problem solving process (Praxiom Research Group Limited, 2006:Online).

- **Customers:** A customer is anyone who receives products or services from a supplier. A customer can be either external or internal to the supplier organization (Praxiom Research Group Limited, 2006:Online).

- **Customer satisfaction:** Customer satisfaction is a perception. It is also a question of degree. It can vary from high satisfaction to low satisfaction. If customers believe that an organization have met their requirements, they experience high satisfaction. If they believe that an organization have not met their requirements, they experience low satisfaction (Praxiom Research Group Limited, 2006:Online).

- **Nonconforming products:** When one or more characteristics of a product fail to meet specified requirements, it is referred to as a nonconforming product. When a product deviates from quality requirements, it fails to conform. (Praxiom Research Group Limited, 2006:**O**nline)

- **Nonconformity:** When an organisation deviates from these requirements, a nonconformity occurs. When a product, process, procedure, system, or structure deviates from ISO requirements, a formal nonconformity exists. (Praxiom Research Group Limited, 2006:**O**nline)

Samantaraj (2006:**O**nline) defines organisational transformation as follows:

- **Organizational Tansformation:** It is an term referring collectively to such activities as reengineering, redesigning and redefining business systems. The dominant enablng technology in transforming organisations is information and technology.

CHAPTER 1: SCOPE OF THE RESEARCH

1. INTRODUCTION AND MOTIVATION

1.1 BACKGROUND OF THE RESEARCH PROBLEM

Engineering by its very nature is associated with quality processes. Ineffective processes has the potential to jeopardize the chances of providing consistently, products that meet customer and applicable regulatory requirements. By implication, this senario also calls for organizational transformation. SA Five Engineering (Pty) Ltd (SAF), which will serve as the target organization for this research study, has in the past year suffered numerous complaints of poor products as a result of ineffective processes, impacting on production quality.

Both ISO 9000 and the concept of Total Quality Management have the potential to mitigate ineffective processes within SAF. It is believed that ISO 9000 will improve management systems for the design, development, purchasing, production, installation and servicing of SAF products and services. Total Quality Management in turn will improve every aspect of the organisation, including a system to design, produce and deploy products and services.

1.2 STATEMENT OF THE RESEARCH PROBLEM

The statement of the research problem pertains to a problem within the research environment, and will form the primary focus of the research (Cooper & Schindler, 2006:96). Against the above background the research problem to be researched within the ambit of this dissertation reads as follows: "Ineffective processes within SAF, impacts adversely on organisational transformation and the reputation it has as a service provider in the engineering industry".

1.3 THE RESEARCH HYPOTHESIS STATEMENT

"Hypotheses are nothing more than tentative propositions set forth to assist in guiding the investigation of a problem or to provide possible explanations for the observations made" (Leedy & Ormrod, 2001:60). The research hypothesis

statement to be researched within the ambit of this dissertation, reads as follows:

(H_o) Implementation of ISO 9000 and Total Quality Management will improve ineffective processes at SAF Engineering, thus improving organisational transformation and enhance the reputation of the organisation as an industry service provider.

(H_i) Implementation of ISO 9000 and Total Quality Management will not improve ineffective processes at SA Five Engineering, thus not improving organisational transformation and not enhance the reputation of the organisation as an industry service provider.

1.4 INVESTIGATIVE (SUB) QUESTIONS

The investigative questions to be researched in support of the research hypothesis, the following:

- Can the implementation of ISO 9000 and Total Quality Management enhance organization's competitive advantage?
- Is Total Quality Management compatible with ISO 9000, and does it facilitate its implementation?
- Do quality management practices influence organizational performance measures?
- To what extent is it a top management responsibility to support the change of organizational culture towards adopting ISO 9000 and Total Quality Management?
- Does the implementation of a bureaucratic business hierarchy benefit an organization more, if compared to a centralized power business hierarchy?

1.5 THE KEY RESEARCH OBJECTIVES

The key research objectives with this research study, the following:

- To analyze the business organization of SAF in order to provide a solution to the research problem.
- To recommend how to improve ineffective processes at SAF to enhance their competitive advantage.

1.6 THE RESEARCH PROCESS

According to Watkins (2008:39), the research process provides insight into the process of 'how' the research will be conducted, from formulating the research proposal to the final submission of the thesis or dissertation. Remenyi, Williams, Money and Swartz (2002:64–65), explains the research process as consisting of eight specific phases, namely:

- Review literature.
- Formalizing a research question.
- Establishing the methodology.
- Collecting evidence.
- Analyzing the evidence.
- Developing conclusions.
- Understanding the limitations of the research.
- Producing management guidelines or recommendations.

According to Collis and Hussey (2003:15), there are six fundamental stages in the process, namely:

- The identification of the research topic.
- Definition of the research problem.
- Determining how the research is going to be conducted.
- Collection of the research data.
- Analysis and interpretation of the research data.
- Writing up of the dissertation or thesis.

Watkins (2008:40-41), suggests a practical research process, which will be applied to this research study:

- Determine the 'field of study' for the proposed research.
- Identify a specific complex problem within a researchable application area.
- Conduct holistic survey of the functional area in which the complex problem exist, to determine the impact of the problem on the specific area of application and the value the proposed research may bring.
- Conduct an abbreviated literature review on the subject matter being investigated.
- Describe and formulate the research problem.
- Describe and formulate the research hypothesis, and associated investigative (sub) questions.

- Select an appropriate research design and methodology, which includes the data collection design and methodology.
- Determine the key research objectives for the proposed research.
- Document the research process, which will be followed for the proposed research and formulate an associated work plan.
- Identify the limitations, which may impact on the proposed research.
- Based on the above, formulate a formal research proposal and submit for approval.
- Establish a structured working relationship with the allocated supervisor.
- Conduct an in-depth literature review on the subject being researched.
- Collect, analyse and interpret the research data.
- Write up the dissertation.
- Proofread the dissertation and submit for formal vetting.

1.7 THE RESEARCH DESIGN AND METHODOLOGY

The research design and methodology to be conducted within the ambit of this research study is applied research, as applied research is designed to apply its findings to solve a specific existing problem. The research will furthermore fall in the social world as the research relates to a structured business research study pertaining to how things are, and why. The research will be conducted from both an empirical and theoretical research paradigm, using a survey for the purpose of data collection.

The research method that will be applied within the context of this research study will be a case study research. Certain elements of the data will also be derived from participation observation.

According to Yin (1994:91), a research design can be defined as; ". . . the logical sequence that connects the empirical data to a study's initial research question and ultimately, to its conclusions. Colloquially, a research design is an action plan from getting here to there, where here may be defined as the initial set of questions to be answered, and there is some set of conclusions (answers) about these questions".

Case study research falls within the context of either the positivistic (quantitative) or phenomenological (qualitative) research paradigms. According to Yin (1994:1), it can be used in many situations of which the following serves as examples:

- Policy, political science and public administration research.
- Community psychology and sociology research.
- Organizational and management studies.
- City and regional planning research, such as studies of plans neighbourhoods or public agencies.
- Research into social science, the academic disciplines as well as professional fields such as business administration, management sciences and social work.

According to Collis and Hussey (2003:68–70), case study research is defined as; ". . . explanatory research used in areas where there are few theories or a deficient body of knowledge". Furthermore, the most salient aspects pertaining to case study research, include the following:

- It is an empirical enquiry that investigates a contemporary phenomenon within its life context.
- 'How' and 'Why' questions are used to explore and understand certain phenomena in a particular context.
- Used when contextual conditions are the subject of research and comprises a comprehensive research strategy.
- Uses multiple methods for collecting qualitative and quantitative data or evidence.

According to Collis and Hussey (2003:68–70), the following case study research types can be identified:

- **Descriptive:** Objective is restricted to describing current practice.
- **Illustrative:** Illustrates new and innovative practices adopted by certain organizations.
- **Experimental:** Examines difficulties in implementing new procedures, techniques and evaluate its benefits in an organization.
- **Explanatory:** Existing theory is used to explain and understand what is happening.

Watkins (2008:47-48) citing Yin (1994), emphasizes the following five components of a research design, which are especially important for case studies:

- **Study questions:** The case study strategy is the most likely to be appropriate for 'how' and 'why' questions, which calls for the initial task being to clarify precisely the nature of the study questions.
- **Study propositions:** A study proposition directs the attention to something that should be examined within the scope of the study. For greater clarity, the proposition points to the, 'reason for the study'.
- **Unit of analysis:** Should the case study involve a specific person being studied, say a person with a rare medical problem, the individual being studied is the primary unit of analysis. The tentative definition of the unit of analysis is related to the way in which the initial research questions were formulated.
- **Linking data to propositions:** A number of ways are open to link data to propositions. An approach suggested by Yin is that of ' pattern matching', whereby several pieces of information from the same case may be related to some theoretical proposition.
- **Criteria for interpreting findings:** If the different 'patterns' are sufficiently contrasting, the findings can be interpreted in terms of comparing at least two rival propositions.

1.8 DATA COLLECTION DESIGN AND METHODOLOGY

Large-scale surveys will serve as the data collection methodology in this dissertation. Watkins (2008:59) describes large-scale surveys as falling within the context of the positivistic (quantitative) paradigm, as it creates the opportunity to collect quantities of data or evidence through the use of questionnaires. Ineffective processes of Engineering Department / Production Division of SAF will serve as the unit of analysis, while SAF as a whole, will serve as the sampling frame. The sample will be selected on the basis of probability sampling. The size of sample will consist of 3 Directors, 16 managers, 11 supervisors and 30 staff members.

1.9 DATA VALIDITY AND RELIABILITY

According to Collis and Hussey (2003:186), validity of data is concerned with the extent to which research findings accurately represent what is happening. More specific, whether the data is a true picture of what is being studied, while reliability of data is concerned with the consistency of the research findings: The study can be repeated in equal settings with the same results. Cooper and Schindler (2006:318-320), identify three major forms of validity, namely 'content validity', 'criterion related validity', and 'construct validity'. In this study, reliability of data will be ensured by using content validity.

1.10 ETHICS

According to Saunders, Lewis and Thornhill, (2000:130), ". . . ethics refers to the appropriateness of your behaviour in relation to the rights of those who become the subjects of your work, or are affected by it". Leedy and Ormrod, (2001:107-108), expand on this to provide a holistic perspective of ethics, namely:

- **Protection from harm:** Participants will be informed of any psychological discomfort ahead of time and any necessary debriefing or counseling will follow immediately after their participation.
- **Informed consent:** The nature of study to be conducted will be conveyed to participants in advance, and they will be given the choice of either participating or not participating.
- **Right to privacy:** The research study will respect participants' right to privacy, and their data will be kept confidential.
- **Honesty with professional colleagues:** Research findings will be reported in a complete and honest fashion, without misrepresenting what they have done or intentionally misleading others as to the nature of their findings.

1.11 RESEARCH ASSUMPTIONS

According to Leedy and Ormrod (2001:62-63), research assumptions are; ". . . what the researcher takes for granted. But taking things for granted may cause misunderstandings. What we may tacitly assume, others may have never considered. If we act on our assumptions, and if in the final result such actions make a big difference in the outcome, we may face a situation we are

totally unprepared to accept. In research we try to leave nothing to chance in the hope of preventing any misunderstanding". Assumptions made in terms of the proposed study, the following:

- All members of the sample frame will be willing to participate in interviews and complete questionnaires,
- Each segment of the population will be represented.

1.12 RESEARCH CONSTRAINTS

Research constraints according to Watkins (2008:72-73), pertain to any inhibiting factor which would in any way constrain the research student's ability to conduct the research in a normal way. According to Collis and Hussey (2003:128-129), 'limitations' identify weaknesses in the research, while 'de-limitations' explain how the scope of the study was focused on only one particular area or entity, as opposed to say a wider or holistic approach.

- Limitations: Due to the fact that the case study is contained within SAF, it may not be possible to apply the findings to other organisations with different organisational structures.
- De-Limitations: This dissertation is based on questionnaires limited to SAF only.

1.13 CHAPTER AND CONTENT ANALYSIS

- **Chapter 1** – Scope of the research: Sets the scene for the research study.
- **Chapter 2** – Provides a holistic perspective of the research environment.
- **Chapter 3** – Literature review of ISO 9000 and Total Quality Management.
- **Chapter 4** – Data collection and design methodology.
- **Chapter 5** – Data analysis and interpretation of results.
- **Chapter 6** - Conclusion.

CHAPTER 2: A HOLISTIC PERSPECTIVE OF THE RESEARCH ENVIRONMENT

2.1 INTRODUCTION AND BACKGROUND

SA Five Engineering (Pty) Ltd (SAF) is in the Mechanical & Structural Engineering Field focusing on vessel repairs, plant maintenance, oil rig and Floating Production Storage and Offloading (FPSO), upgrades and fabrication of sub-sea structures. SAF render services to local and offshore clients in the oil and gas industry, chemical and food industries from all over the world. According to Cooper (2008:Online), SAF is one of the few mechanical engineering contractors to have been certified in accordance with the requirements of South African Bureau of Standards (SABS) ISO 9002, an internationally recognized Quality Management System (QMS), currently converted to ISO 9001 - 2000. This guarantees to clients a very high quality of workmanship, plus recording and trace ability to facilitate future modifications, expansions and replacements.

SAF is a member of the SA Five Group of companies, together with Peninsula Plumbing and Engineering Works, Air Options, RH Mechanicals and RNB Engineering. The SA Five Group has an international shareholder, namely Ashley Industries of Aberdeen, a multi-disciplined company focusing on the oil and gas industry. SAF has at their disposal the full backing of Ashley Industries, and its affiliated company's resources namely Rigblast and Scopus Engineering.

Cooper (2008:Online), explains that SA Five commenced operations in South Africa in March 1991. In the relatively short period of time elapsed since its inception, the company has established itself as one of the most professional, reliable and efficient contractors in the country. This position has been secured by adopting a policy based on service, quality and safety, benefiting clients, employees and shareholders alike. Directors, Management and Staff have worked together as a mechanical engineering contracting team for the last 20 years, which is undoubtedly the cornerstone of the organizations' success.

In the Western Cape, SAF is a leader in their field, filling major contract roles at key point installations, such as Koeberg Nuclear Power Station and Caltex Refinery. SAF is continually involved in capital projects and maintenance for

clients such as SANS Fibres and African Products, which are representatives of the chemical and food industries. SAF have over three hundred and fifty staff members, all highly skilled in the mechanical and structural engineering field, with all welders coded to a minimum American Society of Manufacturing and Engineering (ASME) IX qualification. With all company directors in executive roles, top management is available to their clients at any hour, enabling the decision making process to proceed with speed and efficiency.

SAF are not restricted to the Western Cape where their Head Office and Workshops are located. They have proven ability to transfer their knowledge, professionalism and efficiency across the Southern Continent. The philosophy of managing any project with strong on-site teams operating as self-contained units headed by a resourceful project manager, has met with unqualified success.

Safety and welfare policy is administered by a full time safety officer and a personnel officer and offices, workshops and contract sites are run in strict accordance with the current safety legislation. SAF has undertaken a variety of projects encompassing a vast number of specialisations. The organisation focus primarily on structural engineering projects incorporating, where necessary, other companies within the group. SAF has provided quality services to major companies in the engineering and construction industries, for over a decade.

2.2 ENGINEERING DEPARTMENT'S RESPONSIBILITIES

According to Cooper (2008:**O**nline), the responsibilities of the engineering department include the following:

- The engineering department is responsible for studying in detail contract documents, specifications and technical drawings and where necessary, consult with client and/or consulting engineers to clarify uncertainties.
- In conjunction with relevant project personnel assigned, develop method statements for the various phases and or disciplines of the project work scope to be performed.
- Advise and assist the planning personnel assigned with the development of baseline schedules in accordance with agreed methodologies.

- Ensure individual work packages are compiled in accordance with the work breakdown structure defined.
- Create material take-offs for products required and where applicable, prepare purchase requisitions and enquiring documentation.
- Raise engineering and technical queries, agree alternatives, interpretations, concessions or methodologies, and ensure that appropriate records are maintained accordingly.
- Produce fabrication drawings, sketches and final as-built drawings as required and or stipulated.
- Liase with Quality Control (QC), planners, project managers and other relevant parties with regard to any peculiarities or issues of importance that may have an impact on project execution.
- Interpreting technical specifications from clients, to assist the construction workforce and support systems with technical know-how and ensuring that the project runs smoothly. The department embraces the OSH ACT, ISO 9000 and Total Quality Management, to ensure customer satisfaction.

2.3 SA FIVE ENGINEERING PROJECTS / CLIENTS

Cooper (2008:**O**nline), provides insight into the current projects / clients of SAF, which are elaborated upon below:

2.3.1 Offshore clients

- Blue water Energy Services B.V.
- OCEANEERING (PTY) LTD
- SAIPEM
- Technip
- Dresser Kellogg South Africa

2.3.2 Local clients

- CALTEX,
- ESKOM,
- KOEBERG NUCLEAR POWER STATION,
- SANS FIBRES,
- AFRICAN PRODUCTS,
- MOSSGAS,
- SALDANHA STEEL,

- TABLE MOUNTAIN TABLE WAY AND
- MURRAY AND ROBERTS

2.3.3 Offshore projects

They have grouped their projects under the following categories:

- FA Platform Modifications (RSA)
- FPSO "GLAS DOWR"- Piping/Electr./Instrumentation/Structural & Mechanical.
- FPSO "OCEAN PRODUCER"
- SUBSEA STRUCTURES - PLEM - LATERALS (RSA)
- RO1 PROCESS MODULE (RSA)
- SAIPEM Pipe Pulling Heads & Sub-sea Structures

2.3.4 Process plant

- Greenfields – Maize Plant, Phase I and II
- High Speed Printing Press
- Mossel Bay, 'GAS TO LIQUIDS' Plant
- PET-2 PLANT
- SASOL TRO RACKS
- Water-Treatment Pump Station

2.3.5 Rig and ship maintenance & convers

- DE BEERS Grand Banks – Marine Conversion
- DLV Castoro Otto
- Helideck Support Structure M/V Zacharias
- Orca Drilling Rig Conversion
- Pride Angola Drill Ship Riser Hold Covers
- DE BEERS 'Debmar Atlantic' Vessel Upgrade

2.3.6 Shut down and plant maintenance

- Caltex Refinery Maintenance and Shutdown
- FPSO 'GLAS DOWR' Operations
- Koeberg Nuclear Power Station
- Mossel Bay Refinery Shutdown
- Saldanha Corex & Midrex Reline

2.3.7 Structural steel work

- Land Based Gantry
- Refractory Rising Platform
- Table Mountain Cableway

2.3.8 Tanks

- Caledon Steep Tank Plant
- Sulphur Pastille Silo

2.3.9 Workshop fabrication

- Various Workshop Projects

The attention of the reader is drawn to the fact that it was stated earlier that SA Five Engineering (Pty) Ltd (SAF) is in the mechanical & structural engineering field focusing on vessel repairs, plant maintenance, oil rig and FPSO upgrades and fabrication of sub-sea structures. Furthermore, SAF render services to local, and offshore clients on the oil and gas industry, chemical and food industries from all over the world. Detail of SAF projects as reflected by Cooper (2008:**O**nline), are listed in Annexure A.

2.4 CONCLUSION

In this chapter, a holistic perspective of the research environment was provided providing insight into SAF operations, the reponsibilities of the engineering department and projects and clients. In Chapter 3, a literature review will be conducted on the concepts of ISO 9000 and Total Quality Management.

CHAPTER 3: ISO 9000 AND TOTAL QUALITY MANAGEMENT

3.1 BACKGROUND AND INTRODUCTION

ISO 9000 and Total Quality Management (TQM) were mooted independently of each other, and for very different reasons. According to John Stark Associates (1998:**O**nline), Total Quality Management is an approach to the art of management, that originated in Japanese industry in the 1950's, as a way to help that nation compete in the international market, since then it has become steadily more popular in the West. According to Goetsch and Davis (2002:3), the International Standards Organization (ISO) based in Geneva Switzerland, is a non-governmental organization, which was established in 1947 to promote standards in international trade, communications and manufacturing. Goetsch and Davis (2002:315), states that ISO 9000 was developed in response to the need to harmonize dozens of national and international standards relating to quality, and it is a worldwide federation of national standards organizations from 130 nations.

ISO 9000 and TQM are not interchangeable. ISO 9000 and TQM do not map to each other in terms of content and function. By definition, ISO 9000 is concerned only with management systems involved in the design, development, purchasing production, installation and servicing of products and services. Total Quality Management by definition, encompasses every aspect of the business or organization. It involves every function and level of the organization, unlike ISO 9000, which involves systems to design, produce and deploy its products and services, including support system (Human Resources, Marketing, Finance, etc). Total Quality Management ensures that management is responsible for developing the organization's vision, establishing guiding principles (Codes of Conduct), setting the strategy and tactics for achieving the vision within the constrains of the guiding principles. (Goetsch & Davis, 2002:312)

In terms of the differences between ISO-9000 and TQM, Bishop (2008:**O**nline) provides the following (rather lenghty) verbatim discussion on the subject:

"Both ISO-9000 and Total Quality Management are both necessary for any organization to become world class. But ISO is far superior because it offers a set of guidelines for quality management and can stand alone, while TQM can

not. Total Quality Management, which generally refers to some program of continuous improvement, is the wrong name. It is not quality management but process management -- the process of improvement. And it is not total since it only addresses one aspect of quality management -- improvement. Sometimes, TQM deals with things that don't even impact quality from the customers' point of view. ISO-9000 is total quality management. It requires management of every process in an organization that impacts quality. While ISO-9000 is a clearly defined system, TQM is a philosophy".

ISO-9000 is an excellent tool for managing quality. Its core requirements have the same meaning worldwide. TQM on the other hand is a philosophical concept, with no generally accepted definition. Like religion, there are as many versions as there are advocates, thereof ISO-9000 is preventive, while TQM is remedial. ISO-9000 systematically addresses every area of a business where quality problems can occur. It does this by requiring that management define the potential problems and implement appropriate practices to prevent them. This gives managers broad latitude in determining their policies and procedures, many of which are informal and already exist, but simply need to be documented and followed consistently. (Bishop, 2008:**O**nline)

There are a plethora of areas within a typical to any business where quality problems can originate. They include order entry, design control, material procurement, document control, process control and training, to name but a few, ISO-9000 addresses each of these areas to ensure that management has a plan in place to prevent quality problems. TQM is aimed at identifying the causes of quality problems and eliminating them. The theory underpinning the concept is that by involving everyone in solving quality problems, eventually all problems will be eliminated and the company's quality will continue to improve. Unfortunately, TQM is based on studying past data, which amounts to examining the barn door after the horse has boltedun. (Bishop, 2008:**O**nline)

3.2 ISO 9000 AND TOTAL QUALITY MANAGEMENT DEFINED

Kirchner (1995:**O**nline), defines ISO 9000 as a set of five guideline standards that determine the requirements for an effective quality management system. Of the five, only three are certification standards (ISO 9001, 9002 and 9003); both ISO 9000 and 9004 are guidelines for the other three.

Hashmi (2000:**O**nline), views TQM as a method by which management and employees can become involved in the continuous improvement of the production of goods and services. It is a combination of quality and management tools aimed at increasing business and reducing losses due to wasteful practices. According to Hashmi (2000:**O**nline), TQM views an organisation as a collection of processes. The author maintains that organizations must strive to continuously improve these processes by incorporating the knowledge and experiences of workers. The simple objective of Total Quality Management is to, "Do the right things, right the first time, every time". TQM is infinitely variable and adaptable. It is the culture, attitude and organization of a company that strives to provide customers with products and services that satisfy their needs. The culture requires quality in all aspects of the company's operations, with processes being done right the first time, and defects and waste eradicated from operations.

Goetsch and Davis (2002:7), define ISO 9000 as, "an international set of five related standards for qualification of global quality assurance and quality control standards specifying quality management system requirements to demonstrate an organization's ability to consistently provide products that meets customer and applicable regulatory requirements".

According to Bottorf (2006:**O**nline), TQM is an approach to organisational performance improvement that is distinguished from other approaches by its key word 'total', which emphasizes a holistic or 'total approach' to the firm's improvement program. According to Bottorf (2006:**O**nline), TQM's focus is unique in that it truly focuses on the well being and excellence of the entire enterprise, as well as the larger system which the enterprise operates in. Total Quality Management is also unique among improvement philosophies because of its ethic of inclusiveness, as TQM truly includes everything and everybody in its mission including, all employees, all stakeholders, all suppliers and especially all customers (both internal and external).

3.3 OBJECTIVES AND PURPOSES OF IMPLEMENTING TOTAL QUALITY MANAGEMENT AND ISO 9000

According to Goetsch and Davis (2002:316-317), the original reason that mooted the establishment of ISO 9000, was to replace dozens of national and international quality standards with one single family of standards universally

recognised and used worldwide. The objectives according to Goetsch and Davis (2002:316-317), being:

- To improve operations by satisfying ISO 9000 requirements for management responsibility, resource management, product realisation, and measurement analysis and improvement.
- To enable organisations to consistently produce products (including services) that meets the customer requirements and lived up to the organisation's stated intentions.
- To improve organisational performance through better management of processes.
- To have a quality management system that will be recognised worldwide.
- To improve competitive advantage.

Total Quality Management principles according to the Organisation of Health and Human Services (1992:**O**nline), are:

- To provide a framework of exploring the existing operations with the objective to incorporate quality assurance into all operations.
- To provide a mechanism to ensure continual improvements of the process under review by soliciting active participation of staff with a fundamental focus on the department's internal and external customers.
- To foster openness, fairness and sincerity and allow for the involvement by everyone.
- To promote training of employees in interpersonal skills, team function ability, problem solving, decision-making, job management performance analysis and improvement, business economical and technical skills.
- To promote teamwork. With the use of teams, the business will receive quicker and better solutions, also providing more permanent improvements in process and operations.
- To ensure the success of the organization and the supervisor.

3.4 ISO 9000 AND TOTAL QUALITY MANAGEMENT PRINCIPLES

3.4.1 ISO 9000: Eight Quality Management Principles

ISO 9000 has incorporated the following eight quality management principles, which are similar to those of TQM (Goetsch and Davis,2002:6-7):

- **Customer focus:** Understanding their needs, striving to exceed their expectations.

- **Leadership:** Establishing direction, unity of purpose and a supporting work environment.
- **Involvement of people:** Ensuring that all employees at all levels are able to fully use their abilities for the organisation's benefit.
- **Process approach:** Recognising that all work is done through processes and managed accordingly.
- **System approach to management:** Expands on the process approach in that achieving any objective, requires a system of interrelated processes.
- **Continual improvement:** As a permanent organisational objective, recognizing and acting on the fact that no process is so good, that further improvement is impossible.
- **Factual approach to decision making:** Acknowledging that sound decisions must be based on factual data and information.
- **Mutual beneficial supplier relationship:** Synergy can be found in such relationships.

According to Hashmi (2000:**O**nline), TQM serves as a basis for the following activities:

- Commitment by senior management and all employees.
- Meeting customer requirements.
- Reducing development cycle times.
- Just In Time/Demand Flow Manufacturing.
- Improvement teams.
- Reducing product and service costs.
- Systems to facilitate improvement.
- Line management ownership.
- Employee involvement and empowerment.
- Recognition and celebration.
- Challenging quantified goals and benchmarking.
- Focus on processes / improvement plans.
- Specific incorporation in strategic planning.

3.4.2 Important Aspects of Total Quality Management

John Stark Associates (1998:**O**nline) lists customer-driven quality, top management leadership and commitment, continuous improvement, fast response, actions based on facts, employee participation, and a TQM Culture as important aspects concerning TQM. The authors continue by discussing

how organizational transformation can be achieved through these aspects, which are elaborated below:

- **Customer-driven quality:** TQM has a 'customer-first' orientation. Customer satisfaction is seen as the company's highest priority. The company believes it will only be successful if customers are satisfied. Within the TQM context, customer requirements' goes beyond defect and error reduction, and merely meeting specifications or reducing customer complaints. The concept of requirements are expanded upon to take in not only product and service attributes that meet basic requirements, but also those that enhance and differentiate them for competitive advantage.
- **TQM leadership from top management:** Total Quality Management is a way of life for a company. Top management is the key point in introducing and leading the TQM implementation. Commitment and personal involvement is required from top management in creating and deploying clear quality values and goals consistent with the objectives of the company, and in creating and deploying well-defined systems, methods and performance measures for achieving those goals.
- **Continuous Improvement:** Continuous improvement of all operations and activities is at the heart of TQM. Once it is recognized that customer satisfaction can only be obtained by providing a high-quality product, continuous improvement of the quality of the product is seen as the only way to maintain a high level of customer satisfaction. Furthermore, also recognising the link between product quality and customer satisfaction, Elimination of waste is a major component of the continuous improvement approach. There is also a strong emphasis on prevention rather than detection, and an emphasis on quality at the design stage.
- **Fast response**: To achieve customer satisfaction, companies have to respond rapidly to customer needs. This implies short product and service introduction cycles. These can be achieved with customer-driven and process-oriented product development because the resulting simplicity and efficiency greatly reduce the time involved.
- **Actions based on facts**: Facts and analysis provide the basis for planning, review and performance tracking, improvement of operations, and comparison of performance with competitors. The TQM approach is based on the use of objective data, and provides a rational rather than an emotional basis for decision-making. The statistical approach to process management in both engineering and manufacturing recognises that most problems are system-related, and are not caused by particular employees.

- **Employee participation**: A successful TQM environment requires a committed and well-trained work force that participates fully in quality improvement activities. Such participation is reinforced by reward and recognition systems, which emphasise the achievement of quality objectives.
- **A TQM culture**: An open, cooperative culture has to be created by management. Employees have to be made to feel that they are responsible for customer satisfaction. They are not going to feel this if they are excluded from the development of visions, strategies, and plans. They are unlikely to behave in a responsible way if they see management behaving irresponsibly – 'saying one thing and doing the opposite'.
- **Product development in a TQM environment**: Without a TQM approach, product development is usually carried on in a conflictual atmosphere where each department acts independently. Short-term results drive behavior so scrap, changes, work-arounds, waste, and rework are normal practice. Product development in a TQM environment is customer-driven and focused on quality. Teams are process-oriented, and interact with their internal customers to deliver the required results. Management's focus is on controlling the overall process, and rewarding teamwork.

Hashmi (2000:**O**nline) list the following as key principles of TQM:

- **Management Commitment:** Plan- Do-Check-Act
- **Employee Empowerment:** Training, Suggestion scheme, measurement and recognition, excellence teams.
- **Fact Based Decision Making:** Statistical Process Control and Team Orientated Problem Solving.
- **Continuous Improvement:** Supplier partnership, service relationship with internal customers, excellence teams, cross-functional process management, and attain, maintain, and improve standards.
- **Customer Focus:** Never compromise quality, customer driven standards.

If an organization is ISO-9000 certified by an accredited registrar, one can be certain that it is in compliance with the key elements of the standard and that the continuous improvement loop described above is functioning. If a business wishes to remain competitive, it must have a robust quality management program. ISO-9000 is the only globally accepted, all-purpose model for quality management in the world. Once an organization becomes certified to ISO-9000, a maturing process begins, which can take from two to five years. This is because human beings take time to adjust to change. After the quality management system has matured sufficiently, a vigorous program of team-based continuous improvement (TQM), could help to further improve quality. The advanced tools of improvement, such as Failure Mode and Effect Analysis (FMEA), Quality Function Deployment (QFD) and six-sigma could also help to move the company toward being a world-class operation. But until there is a solid foundation of quality management, which only ISO-9000 provides, there is little to be gained from these advanced techniques (Bishop, 2008:**O**nline).

Kurtus (2001:**O**nline) points out that by becoming registered in ISO 9000, a company is verifying that it is fulfilling the general requirements for operating a business in an effective manner. Controversially, TQM is a way of running a business that concentrates on satisfying the customer. Its use will result in repeat and continued business. TQM should usually be started after a business properly documents its activities, as per ISO 9000. Besides satisfying the customer, TQM also is concerned with empowering the workers, this will ensure that their skills are effectively used and that they feel they have a stake in the success of the organisation.

A final aspect of importance is the fact that TQM use statistics to determine the correct areas to make changes and improvements. Companies that have honestly employed ISO 9000 and/or TQM have been proven to be better run, have fewer problems, have less waste, get more repeat business, and have increased profits. A good product line, effective marketing, and being able to beat the competition are important factors when measuring efficiency. By employing first ISO 9000 and then TQM methods, a company can attain competitive advantage ahead of its competitors.

According to Kirchner (1995:**O**nline), to understand the relationship between ISO 9000 and TQM, one has to evaluate the concepts individually and then comparatively. This will bring about an understanding and exploring their

relationships, commonalities and differences. A definition of TQM holds the concept to be, "a well-planned, company wide process, integrated into the company's business plan that achieves the goal of never-ending continuous improvement of all business processes in order to satisfy customer requirements, both internal and external". This definition suggests that TQM is a process and a 'journey', not a 'destination'. It is a philosophy, culture and way of doing business. If TQM is seen as 'something else to do' rather than 'this is our culture and way of doing business', then the effort will probably not succeed. Performance excellence and customer delight signifies the success of TQM.

Through an evolutionary process, ISO 9000 has aligned itself more closely with the TQM philosophy, elements of which are tabulated in Table 3.1 for ease of reference.

Table 3.1: Total Quality Management Characteristics compared with ISO 9000 (**Source:** Goetsch & Davis, 2002:313).

COMPARISON OF TQM & ISO 9000 CHARACTERISTICS		
Characteristics of Total Quality Management	**ISO 9000:2000**	**TQM**
Customer Focus (Internal and External)	√	√
Obsession with quality		√
Scientific approach to problem solving	√	√
Long-term commitment	Partial	√
Teamwork		√
Continual process and product improvement	√	√
Education and training intensive	√	√
Freedom through control		√
Unity of purpose	√	√
Employee involvement and empowerment	Partial	√

Kirchner (1995:**O**nline), lists TQM success factors, successful implementation keys, characteristics of successful TQM, five phases of TQM journey, the TQM paradigm, Statistic Process Control and ISO 9000 (elaborated upon below) as imperatives for the success of TQM.

3.5.1 Critical TQM success factors

Critical TQM success factors are as follows:

- Strong support from management at all levels, but especially from the very top.
- Directions and priorities set by a quality council, which typically consist of the top manager and his or her staff.
- The right training at the right time for all employees.
- Good team facilitation.
- Employee empowerment.
- Decisions based on data (rather than intuition or guesswork).

According to Kirchner (1995:**O**nline), citing Fortune Magazine (1993), the successful TQM implementation keys are as follows:

- The Chief Executive Officer (CEO) must be visibly involved and committed.
- Customer focus is critical.
- TQM must be linked to a very few clearly defined strategic goals.
- Changes must be linked to a clear financial payback-and don't wait forever.
- Don't adopt an 'off the shelf' quality process.

3.5.2 Characteristics of successful TQM

A successfully functioning TQM process exhibits nine primary characteristics as listed below (Kirchner 1995:**O**nline):

- Continuous, visible support by all levels of management.
- Decision making based on factual data rather than intuition, opinion or remembered experience.
- Continuous, objective measurement of and planned response to all key process parameters.
- Continuous planned training for all employees.
- Teamwork at all levels in the organization, at all times.
- Employee empowerment, i.e., clarifying responsibility and authority to act for all employees.
- Clear, unambiguous communication, vertically and horizontally, throughout the organization.
- Trust of and by all employees.
- Honesty in all actions; no hidden agendas.

The above list may seem impossible to achieve. While there will almost always be exceptions in any organization, a TQM organisation will substantially exhibit all of these characteristics, with only occasional minor lapses or exceptions.

3.5.3 Six attributes of successful TQM programs

Britannica (2008:**O**nline) citing (Jablonski, 1992), identified six attributes of successful TQM programs and a five-phase guideline for implementing TQM, namely:

- Customer focus (includes internal customers such as other departments and co-workers as well as external customers).
- Process focus.
- Prevention versus inspection (development of a process that incorporates quality during production, rather than a process that attempts to achieve quality through inspection after resources have already been consumed to produce the good or service).
- Employee empowerment and compensation.
- Fact-based decision making.
- Receptiveness to feedback.

3.5.4 Five-phase guideline for implementing TQM

The five-phase guideline include the concepts of preparation, planning, assessment, implementation, and diversification. Each phase is designed to be executed as part of a long-term goal of continually increasing quality and productivity. Jablonski's approach is one of many that has been applied to achieve TQM, but contains the key elements commonly associated with other popular total quality systems. (Britannica, 2008:**O**nline citing Jablonski, 1992)

- **Preparation**: During preparation, management decides whether or not to pursue a TQM program. They undergo initial training, identify needs for outside consultants, develop a specific vision and goals, draft a corporate policy, commit the necessary resources, and communicate the goals throughout the organisation.
- **Planning**: In the planning stage, a detailed plan of implementation is drafted (including budget and schedule), the infrastructure that will

support the program is established, and the resources necessary to begin the plan are earmarked and secured.

- **Assessment**: This stage emphasises a thorough self-assessment—with input from customers/clients—of the qualities and characteristics of individuals in the company, as well as the company as a whole.
- **Implementation**: At this point, the organisation can already begin to determine its return on its investment in TQM. It is during this phase that support personnel are chosen and trained, and managers and the work force are trained. Training entails raising workers' awareness of exactly what TQM involves and how it can help them and the company. It also explains each worker's role in the program and explains what is expected of all the workers.
- **Diversification**: In this stage, managers utilise their TQM experiences and successes to bring groups outside the organisation (suppliers, distributors, and other companies who have impact the business's overall health) into the quality process. Diversification activities include training, rewarding, supporting, and partnering with groups that are embraced by the organisation's TQM initiatives.

3.5.5 Five phases of the TQM journey

According to Kirchner (1995:**O**nline) most organisations on the TQM journey pass through five distinct phases. While these phases are not precise and perfectly distinct, all of the various elements will eventually be recognised and addressed. Organisations will not attain perfection in all areas at all times, but they can continue to strive for perfection, even in the face of delays and setbacks. Pursuing TQM increasingly creates an attitude that says, "mistakes are not acceptable".

The five phases identified by Kirchner (1995:**O**nline), the following:

- **Phase 0:** Is the usual starting point. Product and service quality are not improving. At best, they are status quo and at worst, are deteriorating. This phase is characterized by an inspection mentality: Find the problems and fix them.
- **Phase 1:** Is the awakening. At this stage, top management begins visioning. They develop and document a vision of improved quality, along with a strategic quality plan. Total customer satisfaction becomes the new focus.

- **Phase 2:** Is the progression toward quality improvement. Root-cause analysis, corrective action and process measurements and improvements begin. Quality improvement teams are first trained in statistical process control, problem solving and teamwork. These teams are then set to work to achieve the vision and strategic quality plan.
- **Phase 3:** Is the point at which business and manufacturing processes are under control; only randomly caused variations remain within processes. Procedures and work instructions have been developed and effectively implemented. Control charts are routinely used for critical processes and parameters, and the concept of process capability is universally understood and measured as needed. Training and education are ongoing.
- **Phase 4:** Is the designing of products and processes to the requirements of customers, both internal and external. Business process reengineering frequently bridges phases 3 and 4. Concepts such as quality function deployment, design for manufacturability, failure-mode-and-effect analysis, value engineering and reliability engineering are being implemented. This is the design-for-quality phase.
- **Phase 5:** Is the new corporate (or business unit) quality culture. All employees have a *'do it right the first time'*, attitude. The culture is oriented toward defect and problem prevention rather than toward corrective action. Management support is continuous and visible, and decisions are generally based upon facts, the results of routine process measurements and analyses.

3.5.6 The TQM paradigm

The TQM paradigm has 15 elements according to Kirchner (1995:**O**nline), all of which are interwoven rather than separately distinct:

- There is a clearly defined and documented quality policy.
- Documented quality plans are an integral part of the strategic business plan.
- The organisation focus is customer satisfaction, both internal and external.
- The organisation's culture is teamwork-oriented at all levels.
- Senior managers actively demonstrate and are committed to quality in all their actions.
- Everyone knows his or her role in causing quality to happen.
- Education and training are planned and perpetual activities.
- There is an effective and documented quality management system.

- There is a well-developed cost-of-quality system that is actively used to measure quality performance and direct improvement efforts.
- All organisation functions are viewed as an integrated system of interdependent processes.
- There is a documented, formal system for achieving, controlling and improving quality in all aspects of the organisation's functions.
- There is a general attitude of continuous effort to reduce errors and defects, discover and eliminate waste, and simplify all processes.
- There is a general attitude that defects and errors are not acceptable, and their prevention must be designed into all processes.
- There is a continual effort to reduce variation in routine operations.
- Quality is what the customer says it is.

Kirchner (1995:**O**nline) states that in order to achieve the TQM paradigm, the conventional wisdom is, 'solving a crisis is success'. However, the TQM wisdom is, 'not having a crisis is success'. The latter is much harder to measure (you can count crises), but in successful organisations, prevention is the established culture and philosophy.

3.5.7 Total Quality Management

Kirchner (1995:**O**nline) is the opinion that most people agree that successful organisations have two primary objectives, namely 'performance excellence' and 'customer delight'. To achieve these objectives, three structural elements are required, namely: TQM (philosophy and goal), teamwork (execution vehicle) and Statistical Process Control (implementation tools). Many organisations select one or two of the three elements and think that they will achieve the two primary objectives. Organisations failing to realise that the two primary objectives can only be achieved by effectively utilising all three structural elements.

3.5.8 Statistical Process Control

Technically, SPC is the application of statistical methods to the measurement and analysis of variation in any process. More specific, SPC is an integrated system of tools and techniques to provide objective insight into problems, which leads to the determination of root causes of problems. These tools can take objective corrective action to alleviate root causes. Thereafter, control

systems and/or process revisions can be installed to prevent recurrence. (Kirchner, 1995:**O**nline)

3.5.9 ISO 9000

Kirchner (1995:**O**nline) identifies the following elements to consider when seeking ISO 9000 certification:

- Establishes a minimalist quality management system that facilitates consistent quality.
- Specifies what processes need to be in place.
- Is a process standard, not a product standard.
- Is not a TQM process but does contain many TQM elements.
- Is site-specific-uniquely designed and implemented for each location.
- Requires ongoing audits (internal and external), plus recertification.
- Is not inexpensive.
- Requires you to document what you do and do what you document.

While not explicitly stated, five overriding themes are contained within the context of ISO 9000. These themes have been greatly amplified and strengthened in the 1994 revisions, to the standards. These themes include, integration of process steps across functional boundaries, consistency of application and execution, effectiveness of implementation, adequacy of processes to meet standards, and compliance to documented procedures and work instructions.

Kirchner (1995:**O**nline), expands on ISO 9000-1 as having the following five quality objectives:

- Achieve, maintain and seek to continuously improve product quality (the standards define 'product' as the output of any process. As a result, this term also applies to 'services', whether internal or external to the organisation).
- Improve quality of operations to continually meet all customers' and other stakeholders' stated and implied needs.
- Provide confidence to internal management and other employees that requirements for quality are being fulfilled and maintained, and that quality improvement is taking place.
- Provide confidence to customers and stakeholders that requirements for quality are being, or will be, achieved in the delivered product.

- Provide confidence that quality system requirements are fulfilled.

Reading the standards, particularly ISO 9000-1 and 9004-1, in conjunction with the most comprehensive of the three certifying standards, namely ISO 9001, and an analysis of all the relationships, leads to an understanding of the concept, which is summarised below:

- Run the business in a controlled and disciplined manner.
- Management must plan what should be done.
- Clearly communicate the plan to the work force.
- Monitor plan performance.
- Produce records of plan performance.
- Prove that the plan is working.
- If nonconformances occur, the cause can be determined and eliminated to prevent recurrences.

Key to all three certifying standards (ISO 9001, 9002 or 9003), are: "Prevent problems (nonconformances) before they occur and detect problems (nonconformances) if they do occur".

Goetsch and Davis (2002:8), believe that ISO 9000 series requirements as clearly defined, but how the requirements are to be met, is largely the responsibility of the organisation. Clear documentation of all work processes affecting quality is required, which includes procedures pertaining to work instructions, basic training for employees, including process flow chart displayed in work areas. The standard requires that a basic quality system be implemented to ensure customers that suppliers have the capability and systems to provide quality products and/or services. ISO 9000 Simplified (2008:Online) summarises the five step ISO 9000 implementation approach as below:

- **Step 1: Preparation**

- **Get an understanding of ISO 9001:2000:** ISO 9001:2000 is a world-wide accepted standard for quality management requirements. As such, ISO 9001:2000 focuses on a large variety of business activities – not merely on quality testing. Implementing ISO 9001:2000 will affect virtually all business processes.

Note: "ISO 9000", "ISO 9001" and "ISO 9001:2000" all mean the same: the ISO 9001:2000 standard.

Foley (2008:**O**nline), explains ISO 9000 as family of standards that has been developed to assist organizations of all types and sizes to implement and operate effective quality management systems. ISO 9000 describes fundamentals of quality management systems and specifies the terminology for quality management systems.

- **ISO 9001:2000: Quality Management Systems – Requirements:** ISO 9001 specifies requirements for a quality management system that can be used by any organisation. This is the standard against which an organisation can achieve registration, via a qualified third party audit. The primary focus of the ISO 9001 standard is to address customer satisfaction through the use and continual improvement of quality planning and objectives. The standard requires that organisations utilise a process approach to achieve these goals.

Hanzl (2008:**O**nline) dictates the five-step approach. The first step is to appoint an ISO 9000 'management representative'. This is typically a quality manager or senior manager of the company; it needs to be somebody who has sufficient authority to change the way that the company works. This person is responsible for the ISO 9000 implementation. Larger companies may appoint a management representative for each physical location or for each business unit; a corporate management representative would then coordinate among all local management representatives. The management representative then needs to get some training on ISO 9000. Furthermore, he has to ensure that the company executives completely support the ISO 9000 effort; explaining to them the advantages, requirements and costs. Finally, all employees should be informed of the initiative. It is important that the employees do not feel threatened by ISO 9000.

- **Step 2: Quality Manual, Quality Policy and Procedures**

Developing the various documents required by ISO 9001:2000 is for most companies the most difficult part of the ISO 9001:2000 implementation. The main reasons are that these documents have to meet the requirements of the ISO 9001:2000 standard, and that writing these documents at the beginning

of the ISO 9001:2000 implementation, represents a large initial hurdle to overcome.

The required documentation include:

- Quality Manual,
- Six Quality Procedures,
- Quality Policy,
- Quality Objectives, and
- Process Flowcharts.

In addition, ISO 9001:2000 indirectly requires the following:

- **Work Instructions:** Work Instructions are detailed step-by-step instructions on how to perform a particular work process. ISO 9001:2000 does not include an absolute requirement for work instructions, however section 7.5.1 requires work instructions where they add value to the company.
- **Forms:** ISO 9001:2000 does not specifically require forms, but they can be considered both work instructions before they are filled in, and records after they are filled in. For this reason, good forms save time and provide many more benefits.
- **Choose the right Template:** The secret to easy ISO 9001:2000 implementation is the use of good templates. Good templates will not only help one develop a business-friendly ISO 9001:2000 system, they will also simplify the development of all required documentation.

- **Step 3: Implementation, Training and Work Instructions**

  During this phase one introduces the new requirements of the Quality Manual, train employees, and get them to adjust their way of working to any new requirements. It is recommended to take one step at a time during the implementation process. One may wish to start with the section on Document Control. Explain the requirements in a meeting or memo, or have the appropriate department managers explain it to their staff.

- **Training and Work Instructions go Hand in Hand:** As one implements ISO 9000, virtually all employees have to change to some extent the way they work. At the same time, ISO 9000 calls for standardisation and for

work instructions. Instruct people who actually do the work to write up the best way of doing the work. If the Quality Manual calls for a change in their work, introduce those new requirements and make the employees incorporate them into their work instructions. Review the work instructions to ensure that they meet the requirements of the organization's quality manual.

- **Step 4: Internal Audits**

  Internal audits are performed by someone within the company or by a subcontractor. The responsibility of the auditor is to verify that the company meets the requirements of ISO 9000 as it is described in the organisation's quality manual.

- **The Auditor:** In most cases, the ISO 9000 management representative is also responsible for internal audits. In this instance, the management representative audits the entire company except his/her own work, and another employee audits the work of the Management Representative. Larger companies often appoint and train several internal auditors. This is an excellent opportunity for cross training and for staff of different departments to learn what other departments are doing.

- **Audits as Training Tool:** It is recommended to start Step 4 even before Step 3 is complete. Once internal audits are complete highlighting no significant problems, the company is ready for the certification audit.

- **Step 5: Certification**

In this step, a registrar is selected and request is made for certification.

- **Reaping the Marketing Benefits:** Once the organisation successfully passed the certification audit, it should leverage the certification in marketing the attainment of the achievement. More importantly, the organisation should recognise employees for the hard work they put into the effort.

- **Life after Certification:** ISO 9001:000 certification represents the start of the process and the registrar will want to perform surveillance audit once or twice a year. ISO 9000 system is designed to continually improve

itself. It is of importance to ensure that internal audits continue and that bottom line profitability results from the initiative.

3.6 From ISO 9000 to TQM

Having evaluated TQM and ISO 9000 as separate entities, Kirchner (1995:**O**nline), now looks at them together and comparatively, using the following contextual example. First visualize two circles, one about the size of a soccer ball and one about the size of a tennis ball. Now overlay the two circles so that the smaller is about 95 percent inside the larger one. The large circle represents TQM and the small one ISO 9000. TQM is a larger, more comprehensive system, but almost everything in ISO 9000 is also in TQM.

It has been observed when analysed organisations that have attempted to implement TQM and were not successful, that the culture was not ready for TQM. The unsuccessful organisations almost always lacked discipline and control of their business processes. These problems are exactly what ISO 9000 focuses on eliminating, while keeping customer satisfaction as the primary goal. More specific, ISO 9000 is the process that typically shifts an organisation's culture to allow successful TQM implementation.

To better understand this transformation process, Kirchner (1995:**O**nline), lists the following areas of commonality between TQM and ISO 9000.

- Top management leadership, commitment and involvement.
- Prevention of errors and defects.
- Detection and correction of errors and defects.
- Dependency and integration of processes.
- Customer focus, internal and external.
- Root-cause corrective action process.
- Training.
- Control of product and process design.
- Statistic Process Control.
- Effective implémentation.
- External customer service.

There are only two areas in ISO 9000 not explicitly in TQM, but they are implicitly there. They are 'customer-supplied product control' and 'quality records'.

An analysis by (Kirchner 1995:**O**nline), of both ISO 9000 and TQM lead to the following conclusions:

- For most organisations, ISO 9000 establishes necessary process discipline and control, which is typically a prerequisite to the broader demands of TQM.
- ISO 9000's requirements are minimum success requirements for almost any business.
- ISO 9000 is a minimalist quality management system.
- ISO 9000 is the primary stepping-stone toward TQM for most organizations.

Anonymous 1 (2008:**O**nline), explains that TQM requires a change in the way in which businesses operate. It implies a number of things if it is to work successfully:

- Management structures have to be more consultative and less hierarchical.
- Workers have to be empowered to be able to make decisions at all levels of the organisation.
- Workers have to be trained and involved in the building of the philosophy.
- Communication links between workers and management and between the business and all aspects of the supply chain must be excellent.
- Commitment to TQM must be backed by action, which the customer can see, and experience.
- Commitment to the process must be led by the senior management of the business - paying 'lip service' will invariably end up in failure.

According to Anonymous 1 (2008:**O**nline), TQM can be addressed in a business in a number of ways. The most common are:

- **A policy of zero defects:** Any problems in the production process are filtered out before they get anywhere near the customer.
- **Quality chains:** Each stage of the production process is seen as being a link in the chain right down to the relationship between one worker in the process and another.
- **Quality circles:** Meetings of those directly involved in the production process to discuss and solve problems and make improvements to the production process.
- **Statistical monitoring:** The use of data and statistics to monitor and evaluate production processes and quality.

- **Consumer feedback:** Using market research and focus groups to identify consumer needs and experiences and to build these into the process.
- **Changing production methods:** Business enterprises, where appropriate should evaluate the layout of their production processes and continually endeavour to improve.

3.7 TOTAL QUALITY AS AN ORGANIZATIONAL CHANGE MECHANISM

Bacal (2008:**O**nline) suggests that moving to TQM is like any other organisational change initiative. It must be managed effectively, and leaders of the change must take into account aspects of the organisation's current 'culture'. In fact, although TQM brings a number of benefits to those in the organisation, one can expect some people to be cynical and resistant to change.

3.7.1 Organizational Change Principles

Bacal (2008:**O**nline), lists the following as important principles to be observed when an organization implements TQM:

- **Time:** Any change and its attached benefits will take longer to realise than one expects. Typically, it may take as long as two or three years to have TQM working at its peak.
- **Resistance:** Regardless of the objective nature of the change, many people will resist it because it is unfamiliar. TQM must be introduced so that it maximizes people's enthusiasm and minimises resistance.
- **Leadership:** Any change will succeed or fail based on the ability of the change leaders to lead. If management shows that they are committed, employees will become so. If management 'waffles, hedges, and backs off', then employees will see it as just more rhetoric and of little importance.
- **Persistence:** The worst thing a manager can do is start the process, and when it gets difficult, stop it. Managers need to commit over the long term and realise they must be persistent while the rest of the organisations' works at achieving the required results.
- **Consistency:** The primary mistake managers make is that they become inconsistent. This signifies to employees that the manager is not serious. As soon as a manager suggests that a poor product or service be delivered, the initiative results in an exercise in futility. Consistency also

means including employees in the planning of TQM activities, treating employees as the manager's customers.

- **Incentive:** People will embrace changes that they see are in their own self-interest. When presenting or dealing with TQM changes, it is important that managers highlight and focus on the benefits to the people in the organisation.
- **Communication:** Change will be accepted or rejected based on the effectiveness of the communication about it. Communication must be frequent, of a two-way nature, and balanced. It must begin as early as possible in the process.

3.8 WHY TQM FAILED TO DELIVER

Peleska & Zahtlen (1996:**O**nline) list ten potential pitfalls in the implementation of TQM. These 'TQM pitfalls' encountered when doing consultancy and providing quality assurance services for several companies.

3.8.1 Pitfall number 1: The middle management threat

Whenever one starts a TQM campaign, it is of importance to ensure that all influential people in the management hierarchy support the initiative. Middle management attitude has a special impact on the success of such an initiative, since they communicate much closer and much more frequently with lower management than the top-level management. There are two ways to encounter the threat described: If a company has a well-motivated and competent middle management, one should let them participate in the planning of the TQM campaign at an early stage.

Their knowledge about problems and potential of the lower levels of your company hierarchy will help to improve the TQM strategy. Their early participation will ensure that they will help the organisation to convey the enthusiasm, which are required for any successful TQM initiative. If top-management cannot rely on middle management to support their goals appropriately, it is time to reconsider the middle management layer before venturing into a TQM campaign. The risk of wasting money on a useless TQM effort could warrant a call for a change in the middle management.

3.8.2 Pitfall number 2: The ridiculous quality slogan

Successful TQM requires a certain degree of enthusiasm. Some companies decide to stimulate this enthusiasm with slogans expressing the TQM objectives in a simple phrase, which is easy to remember, and which may be suitable to be used by 'TQM cheer leaders'. Slogans could however have a negative impact if they are perceived to be ridiculous.

3.8.3 Pitfall number 3: The culture-replaces-technology misconception

TQM enhances the earlier quality approaches (inspection, quality control and quality assurance) as a result of its 'cultural aspect', and the initiative requires an explicit commitment to continuous quality improvement by every member of the organization. However, this does not replace but rather extend the older approaches.

3.8.4 Pitfall number 4: the quality-means-correctness misconception

Discrepancies have been identified between the quality aspects 'correctness' and 'effectiveness'. The former means 'compliance with the specification', while the latter means, 'suitability for the purpose of the end user'. For thorough quality control, it is important to check compliance of the product with each of these quality aspects.

There are a number of other pitfalls which we will not discuss in detail; however will be listed for the purpose of completeness:
Pitfall number 5: The paper production machine.
Pitfall number 6: Spending all the money on minor quality improvements.
Pitfall number 7: Do not know about quality costs.
Pitfall number 8: Measuring the wrong quality indicators:
pitfall number 9: TQM measures are not appropriate for the cultural background.
Pitfall number 10: The competing-team-pitfall.

Analyzing potential pitfalls when designing a TQM campaign is an advisable technique, to mitigate possible failure.

3.9 ISO 9000 OR TOTAL QUALITY MANAGEMENT: WHICH ONE FIRST?

Jamshidian and Shahin (1994:Online), states that quality systems such as ISO 9000 and Total quality Management (TQM) have been used widely worldwide, still there are mixed views in the literature concerning whether ISO 9000 and TQM complement or contradict each other and which one must be implemented first. The family of ISO 9000 standards have faced criticism that the certification process fails to deal with some important aspects of TQM practices such as leadership, strategic planning and employee empowerment (Rao, Ragunath & Solis, 1997:335-346). As a result, questions have been raised whether an ISO 9000 registration can result in an effective implementation of quality management practices. It is argued that if the clauses of ISO 9001 are interpreted, they contain all the requirements that are associated with quality management practices. The literature indicates that there is a link between the benefits reported by ISO 9000- registered firms and the constructs of quality management practices listed by Rao *et al.* (1997:335-346).

These constructs refer to leadership, information and analysis, strategic quality planning, human resource development, quality assurance, supplier relationships, customer orientation and quality results (Quazi, Hong, & Meng, 2002:53-57). Bradley (1994:50-54) makes the distinction that, while the ISO 9000 standard requires all employees to be aware of and understand the quality policy, TQM bears the additional requirement that they share its aims. Moreover, ISO 9000 does not address comparative or competitive issues. From this, the analogy can be drawn that ISO 9000 cannot be considered as a strategic tool, unlike TQM which embraces customers, competitive performance and benchmarking. TQM must therefore be linked directly to an organisation's strategic planning process on a continuing basis, and used as a vehicle for the realisation of this strategic plan (Taylor & Meegan, 1997:669-686).

3.10 REQUIREMENTS FOR TQM, AND QUALITY OR PROCESS IMPROVEMENT INITIATIVES IN AN ORGANIZATION.

According to Bottorff (2006:**O**nline), all organisational improvement programs have one thing in common, namely their success which depends on the effectiveness of many collective efforts, rather than any single or individual heroic effort. This collective effectiveness cannot be dictated, facilitated, delegated, or otherwise achieved through direct managerial action alone. It can only be inspired, balanced and sustained - indirectly - through the operating environment's ethical-cultural atmosphere, with management as its champion.

From the above, the analogy can be drawn that TQM is not just about boosting the bottom line by improving or streamlining a few isolated processes. Instead, TQM is about boosting the bottom line by doing the right things right, everywhere, for everyone involved, the first time every time. Described in this way, TQM is also an ethic for achieving organisational excellence (Bottorff, 2006:**O**nline).

3.11 TQM'S FOUR CRITICAL STAGES

Bottorff, (2006:**O**nline) explain four stages that organizations have typically experienced when implementing TQM, Six Sigma, and other improvement methodologies.

3.11.1 Stage One: The Leadership Stage.

- This stage generally begins with training the upper and middle management on the general concepts of TQM, and the formation of basic structures to support TQM such as executive steering committee, metrics to aid project targeting (such as cost of quality) and a project management system to approve and administer projects.
- Leadership must live the philosophy and ethics of TQM. The philosophy (like any worthwhile ethic) must be universally applicable to all. TQM truly begins with, and succeeds or fails because of, the strength of this ethic in the practicing organisation.
- Without a deep commitment from top management to develop a healthy culture based on a win-win basis, open communication, shared information and teamwork, most organisations will not succeed in implementing TQM.

3.11.2 Stage Two: The Initiation Stage.

- This stage 'awakens' the organisation to different all kinds of discoveries about how it can improve itself. Quick win projects add to customer satisfaction.
- The culture is energised into new forms of teamwork.
- From an economic perspective, project successes and clear economic dividends makes management's continued investment in the program justified. Monetary rewards are provided to both individuals and groups.
- Motivated staff adds to the potential success of the organisation.

3.11.3 Stage Three: The Decline Stage

- Resistent to change is evident in this stage.
- Without advancements in the quality system infrastructure to help participants cope, and without maintaining cultural balance, people not only become less able but, less willing to sustain the initiative.

3.11.4 Stage Four: The Journey Perpetuation Stage

- In this stage, the focus is on helping the organization cope and advance by working smarter (not just harder), and by managing efforts, ethics, rewards and satisfaction with respect to process improvements. This results in achieving higher levels of teamwork and integration, which make the more complex projects more likely to succeed.
- In this stage, new technology is adopted and emphasis is placed on the championing of higher culture practices.
- This stage emphasizes ethics and culture as much as its technical quality, and there is a shared intuitive awareness at all levels that cultural excellence and technical process capability are dependent on each other.

3.12 TQM AS LARGE SALE SYSTEMS CHANGE

According to Packard (1995:**O**nline), TQM has proven to be an effective process for improving organisational functioning. TQM can be viewed as a large-scale systems change. Another aspect of importance, is the expectations and perceptions of employees (workers and managers) which

should be addressed during the process of change. Specifically, sources of resistance to change calls for particular attention.

3.12.1 People's Expectations and Perceptions

According to Packard (1995:**O**nline), many employees may see TQM as quality circles, management by objectives, or zero-based budgeting. TQM must be used related to key organizational problems, needs, and outcomes. Furthermore, staff may view quality as not really needing attention. For TQM to be effective, employees must see a need for improved quality from their perspectives.

3.12.2 Sources of Resistance

According to Packard (1995:**O**nline) citing Martin (1993) implementation of large-scale change such as TQM will inevitably face resistance. In this respect, two elements are of importance:

- **Low customer satisfaction:** A key element of TQM is working close with customers. Getting feedback about their satisfaction and suggest how an organisation can meet their requirements.
- **Management resistance to employee empowerment is likely to occur:** They may see decision-making authority in 'zero terms', if employees have more involvement in decision-making managers will have less.

3.12.3 Dealing with Resistance

According to Packard (1995:**O**n line) citing Brager & Holloway (1992), several helpful tactics in dealing with resistance to TQM implementation have to do with acknowledging legitimate resistance and changing tactics based on it, using effective leadership to enroll people in the vision of TQM, and using employee participation. A useful technique to systematically identify areas of resistance is the 'force field analysis'. This technique represents an assessment tool for organisational change. It involves creating 'a force field' of driving forces, which aid the change or make it more likely to occur, while restraining forces.

The analysis of the force field involves evaluating which driving forces may be strengthened and which restraining forces may be eliminated, mitigated, or counteracted. If it appears that overall driving forces are strong enough to move back restraining forces, adoption of TQM would be worth pursuing. The change plan would include tactics designed to move the relevant forces. The opposing forces are depicted in Figure 3.1.

A Force Field Analysis

DRIVING FORCES	**RESTRAINING FORCES**
Environmental pressures leading to reduced funds	Middle management fear of loss of control
Staff who may like to be more involved in agency decision making	Lack of time for line workers to take time for TQM meetings
Successful applications of TQM elsewhere	Skepticism based on the organization's poor performance regarding change

Figure 3.1: A Force Field Analysis (**Source:** Packard, 1995:**O**nline).

3.12.4 Implementation Principles and Processes

In this evaluation of implementation principles and processes, specifics of TQM implementation will be discussed and several do's and don't's gleaned from the literature on TQM in the public sector and the human services will be reviewed. (Packard, 1995:**O**nline)

3.12.4.1 Current Reality and Preconditions

A preliminary step in any TQM implementation is to assess the organisation's current reality. Relevant preconditions have to do with the organization's history, its current needs, precipitating events leading to TQM, and the quality of working life of employees. If the current reality does not include important preconditions, TQM implementation should be delayed until the organisation is

in a stable state thus creating the base for TQM to succeed. The 'force field analysis' discussed above is a useful tool in reviewing the current situation.

Conditions Supportive of Change	
MACRO	**MICRO**
Crisis	Top management support
Leaders championing new ideas	Customer focus
Continuity of political leadership	Long-term strategic plan
Healthy civic infrastructure	Employee recognitions and training
Key leaders having shared vision and goals	Employee empowerment and teamwork
Trust among those in power	Measurement and analysis of products and processes
Outside resources	Quality assurance
Models to follow	

Figure 3.2: Conditions supportive of change (**Source:** Packard, 1995:**O**nline).

Essential or desirable preconditions can be identified as either macro issues and micro issues. Macro issues include those, which are concerned with aspects such as leadership, resources, and the surrounding infrastructure. Micro issues have to do with internal aspects such as employee training and empowerment and organisational processes such as quality assurance (Packard, 1995:**O**nline). Macro and micro issues are graphically depicted in Figure 3.2:

3.12.4.2 Some 'Do's and Don't's'

Packard, (1995:**O**nline), reviews several 'do's and don't's' when implementing TQM drawn from the literature on TQM in the public sector and the human services:

- Leadership styles and organisational culture must be congruent with TQM. If they are not, this should be facilitated or the TQM implementation should be avoided or delayed until favorable conditions exist.
- Use input from stakeholder (clients, referring agencies, funding sources, etc.) and maximize employee involvement in design of the system.
- Always keep in mind that TQM should be purpose-driven. Be clear on the organisation's vision for the future and stay focused on it. TQM can be a powerful technique for unleashing employee creativity and potential, reducing bureaucracy and costs, and improving service to clients and the community.

3.13 TOTAL QUALITY MANAGEMENT MODELS

Total Quality Engineering (2007:**O**nline), the forerunner of TQM go back to the teachings of Drucker, Juran, Deming, Ishikawa, Crosby, Feigenbaum and countless other people that have studied, practiced, and tried to refine the process of organisational management. TQM is a collection of principles, techniques, processes, and best practices that over time have been proven effective. Most all world-class organisations exhibit the majority of behaviors that are typically identified with TQM. No two organisations have the same TQM implementation. There is no recipe for organisation success; however, there are a number of TQM models that organisations can use. These include the Deming Application Prize, the Malcolm Baldrige Criteria for Performance Excellence, the European Foundation for Quality Management, and the ISO Quality Management Standards. Any organisation that wishes to improve its performance would be well served by selecting one of these models and conducting a self-assessment.

The simplest of the models of TQM is shown in Figure 3.3. The model begins with understanding customer needs. Total Quality Management organisations continuously collect, analyze, and act on customer information. Activities are often extended to understanding competitor's customers. Developing an intimate understanding of customer needs, which allows TQM organisations to predict future customer behavior.

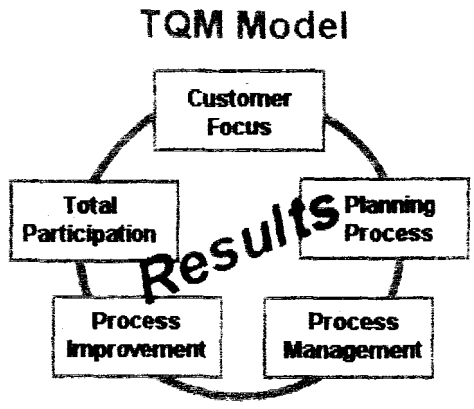

Figure 3.3: Total Quality Management Model (**Source:** Total Quality Engineering, 2007:**O**nline)

Total Quality Management organisations integrate customer knowledge with other information, and use the planning process to orchestrate action throughout the organization to manage day-to-day activities and achieve future goals. Plans are reviewed at periodic intervals, and adjusted as required.

TQM organisations understand that customers will only be satisfied if they consistently receive products and services that meet their needs, are delivered when expected, and are priced for value. TQM organisations use the techniques of process management to develop cost-controlled processes that are stable and capable of meeting customer expectations. TQM organizations also understand that exceptional performance today may be unacceptable performance in the future, resulting in using the concepts of process improvement to achieve both breakthrough gains and incremental continuous improvement. Process improvement is even applied to the TQM system itself. The final element of the TQM model is total participation. TQM organisations understand that all work is performed through people, which begins with leadership. In TQM organisations, top management takes personal responsibility for implementing, nurturing, and refining all TQM activities. They make sure people are properly trained, capable, and actively participate in achieving organisational success. Management and employees work together to create an empowered environment where people are valued. This process should help organisations reduce cycle time, lower costs, and increase innovation.

3.13.1 Elements of TQM

According to Total Quality Engineering (2007:**O**nline), the elements of TQM are:

- Continuous improvement.
- Employee empowerment.
- Benchmarking.
- Just-in-time techniques.
- TQM tools such as Quality Function Deployment, Pareto Charts, Process Charts, Cause and Effect Diagrams, and Statistical Process Control Techniques.

Gardner (1998:**O**nline), discusses a seven-step Total Quality Management model. This model has the objective of helping organizations reduce cycle time, lower costs, and increase innovation. The seven steps in the model encompass the following:

- Establish the TQM and cultural environment, which includes vision, long-term commitment, people involvement, disciplined methodology, support systems, and training.
- Define mission of each component of the organization.
- Set performance improvement opportunities, goals, and priorities.
- Establish improvement projects and plans of actions.
- Implement projects by using improvement methodologies.
- Evaluate.
- Review and recycle.

3.14 BUREAUCRATIC VS ENTREPRENEURIAL BUSINESS HIERARCHIES

Africa Competency Development (2007:31-32), proposes an entrepreneurial business hierarchy as a form of organisational structure emphasising central power. This organisation form is like a spider's web, with one person in the center having all the power to make decisions and give instructions. In this situation there are few collective decisions, much reliance are placed on the individuals and stemming from obtaining approval of a few key figures in the business. The entrepreneurial form of organisation is most commonly found in small, growing businesses that owe their existence to the expertise of a few

people. As the business grows, this type of structure can become a problem because decisions cannot be made without the approval from someone at the center. This can lead to slow decision-making and the people at the center losing touch with what is really happening in the business.

Africa Competency Development (2007:32), furthemore discusses the bureaucratic business hierarchy as the form of organisational structure emphasising the distribution of power, authority and responsibility rather than centralisation. This is the most common organisational structure that most entrepreneurial form businesses grow into. Bureaucratic organisations emphasize different roles / functions (i.e. Finance, HR, Marketing, Production, etc). Operational processes become more predictable and consistent, with standardised procedures that ISO 9000 emphasises and committees replacing individual judgement. The bureaucratic approach is intended to provide organisational control through ensuring a high degree of predictability in peoples behaviour. It is also a means of trying to ensure that employees are treated fairly through the application of general rules and procedures. Authority and responsibility is delegated down through the organisational structure and some form of Management by Objectives becomes the predominant management style. Bureaucracy has been the standard form of structure for large organizations for thousands of years and remains the dominant form today (Africa Competency Development, 2007:31-32).

One of the most serious problems associated with it is the fact that standardizes procedures and rules are generally based on past experiences and are inflexible. This means that bureaucratic organized business can become slow to respond to external changes. (Africa Competency Development, 2007:31-32)

3.15 THEORETICAL MODEL OF THE TOTAL QUALITY MANAGEMENT MODEL

According to Franks (2003:6), the theoretical model of TQM (shown in Figure 3.4), shows how quality management practices influence organisational performance measures. Figure 3.4 depicts all four quality management practices, that influence the performance measure (product / service quality), which in turn influence financial quality. Franks (2003:6), discusses quality management practices and performance measures in Figure 3.4, as follows:

- **Teamwork:** With teamwork, sharing information, problems are solved more efficiently, because no person has all the information and facts available on any problem situation.
- **Supplier Focus:** It is fundamental to have good communication with the supplier to improve inconveniences that may occur on the delivery process (it is best if suppliers know exactly how, where, when and what is expected from them). Poor quality products from suppliers, delay in delivery, supply of damaged products.
- **Customer Focus:** An organisation needs to focus on customer requirements and strive to satisfy them to gain more income. Processes should be implemented that will measure customer satisfaction and get customer feedback as to how the can be satisfied.
- **Learning:** By teaching managers, supervisors and operators on how continual improvement processes works and how to maintain a certain rate of productivity, the organisation will prosper.
- **Global Competition:** An organisation needs to be rated nationally and globally to be successful. By competing with the so-called companies in the world, alone can improve the results of the company.
- **Leadership:** *Good leaders are needed for the purpose of direction. A good* quality leader can cause the company to prosper and have good reputation not just in the market, but in general.
- **Process Management:** It is an approach for planning, controlling and improving the primary process in an organisation by using permanent process teams. The emphasis should be on customer needs, rather than functional needs.
- **Product/Service Quality:** Deals more with customer needs. Satisfied customers brings about profit, which in turn influences financial quality. An organization needs to identify products features that customers say are important in their purchasing design. Products need to be free of deficiencies and waste.
- **Operational Quality:** This practice improves the process operations, reduce / improve the cycle times. It cuts losses and improves productivity.
- **Continuous Improvement:** It brings about success. It keeps improving the overall performance of the organisation. It delights the customers (error free and good quality products) and employees (good working environment), which both influence quality.

- **Employee Fulfillment:** From learning, employees get fulfilled as they become aware of their input to the overall company's output, which boost their performance.
- **Employee Satisfaction:** The improved processes from operational quality make the employee's job easier, creating this good working environment with satisfied employees with better performance. Better performance ensures better product quality and higher profit.
- **Financial Quality:** Operational quality, product quality, customer satisfaction and employee satisfaction influence financial quality.

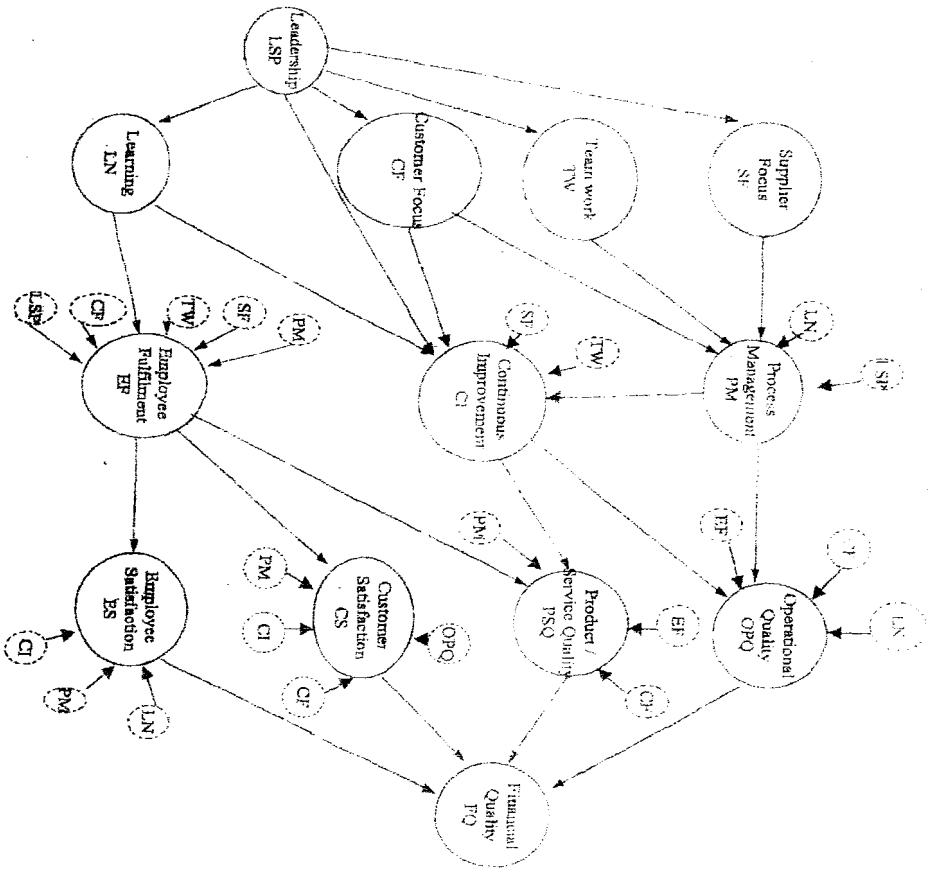

Figure 3.4: Theoretical Model of Total Quality Management Model (**Source:** Franks, 2003:6)

3.16 CONCLUSION

Chapter 3 provides the reader with a comprehensive literature review of ISO 9000 and Total Quality Management. ISO 9000 will provide the organisation with management systems involved in the design, development, purchasing production, installation and servicing of products and services while TQM involves every function and level of the organization. TQM ensures that management is responsible for developing the organization's vision, establishing guiding principles, setting the strategy and tactics for achieving the vision within the constrains of the guiding principles (Goetsch & Davis, 2002:312).

According to Bishop (2008:Online), ISO 9000 systematically addresses every area of a business where quality problems can occur by requiring that management define the potential problems and implement appropriate practices to prevent them, while TQM is aimed at identifying the causes of quality problems and eliminating them. The theory underpinning the concept is that by involving everyone in solving quality problems, eventually all problems will be eliminated and the company's quality will continue to improve.

According to Goetsch and Davis (2002:316-317), from implementing ISO 9000, an organisation can benefit the following:

- Improve operations by satisfying ISO 9000 requirements for management responsibility, resource management, product realisation, and measurement analysis and improvement.
- Enable organisations to consistently produce products (including services) that meets the customer requirements and lived up to the organisation's stated intentions.
- Improve organisational performance through better management of processes.
- Have a quality management system that will be recognised worldwide.
- Improve competitive advantage.

According Organisation of Health and Human Services (1992:Online), from implementing TQM, an organisation can benefit the following:

- To provide a mechanism to ensure continual improvements of the process under review by soliciting active participation of staff with a fundamental focus on the department's internal and external customers.
- To foster openness, fairness and sincerity and allow for the involvement by everyone.
- To promote training of employees in interpersonal skills, team function ability, problem solving, decision-making, job management performance analysis and improvement, business economical and technical skills.
- To promote teamwork. With the use of teams, the business will receive quicker and better solutions, also providing more permanent improvements in process and operations.

CHAPTER 4: ORGANIZATIONAL INEFFECTIVE PROCESSES SURVEY DESIGN AND METHODOLOGY

4.1 THE SURVEY ENVIRONMENT

SA Five Engineering consists of various functional areas, each with a unique role in the delivery of innovation projects for and on behalf of the group. The various functional areas, which will serve as the research environment, include the following:

- Human Resource Management.
- Quality Assurance and Quality Control Department
- Finance Department.
- Purchasing Department.
- Mechanical Engineering Department.
- Information Technology (IT) Department.
- Operations Division.

4.2 AIM OF THIS CHAPTER

The aim of this chapter and the survey contained therein is two-fold:

- To analyze the SAF business organization in order to obtain an internal perspective on the efficiency of operations.
- To recommend how to improve ineffective processes at SAF to enhance their competitive advantage. The ultimate objective being to solve the research problem as defined in Chapter 1, Paragraph 1.2, and which reads as follows:

"Ineffective processes within SAF, impacts adversely on organizational transformation and the reputation it has as a service provider in the engineering industry".

4.3 CHOICE OF SAMPLING METHOD

According to Babbie (2005:196-197), there are two reasons for using a random selection method. First, this procedure serves as a check on conscious or unconscious bias on the part of the researcher. Random selection erases the danger of the researcher, who selects cases on an intuitive basis to support his or her research expectations or hypotheses. Second, random

selection offers access to the body of probability theory, which provides the basis for estimating the characteristics of the population as well as estimates of the accuracy of the samples.

4.4 THE TARGET POPULATION

"A population is any precisely defined set of people or collection of items which is under consideration" (Collis & Hussey, 2003:56). According to Collis and Hussey (2003:155-160), a sample is made up of some of the members of a 'population' (the target population), the latter referring to a body of people or to any other collection of items under consideration for the purpose of research. The 'sampling frame' defined by Vogt (1993:33), as a list or record of the population from which all the sampling units are drawn. The sampling frame randomly drawn from SAF for this survey, comprises of:

- 3 Directors,
- 6 Managers,
- 10 Supervisors, and
- 30 staff members

4.5 DATA COLLECTION

According to Emory and Cooper (1995:278), three primary types of data collection (survey) methods can be distinguished namely:

- Personal interviewing.
- Telephone interviewing.
- Self-administered questionnaires/surveys.

The survey conducted in this dissertation falls within the ambit of the 'descriptive survey', which is determined by the purpose of the study (Ghauri, Grønhaug and Kristianslund 1995:58-64). The data collection methods used fall within the ambit of both the definitions attributed to the concepts 'survey' and 'field study'. Remenyi, Williams, Money & Swartz (2002:290), cited by Watkins (2008:54), define the concept of 'survey' as: "...the collection of a large quantity of evidence usually numeric, or evidence that will be converted to numbers, normally by means of a questionnaire", while according to Gay and Diebl (1992:238), 'survey', is an attempt to collect data from members of a population in order to determine the current status of that population with respect to one or more variables. Kerlinger (1986:372), defines 'field study'

as non-experimental scientific inquiries aimed at discovering the relations and interactions among ... variables in real ... structures. As with the case of most academic research, the collection of data forms an important part of the overall dissertation content.

Leedy and Ormrod (2005:185) are of the opinion that a questionnaire allows the participants to respond to questions with assurance that their responses will be anonymous. This means the respondents can be more truthful than they would be in a personal interview.

4.6 MEASUREMENT SCALES

The survey will be based on the well-known Lickert scale, whereby respondents were asked to respond to questions or statements (Parasuraman 1991:410). The reason for choosing the Lickert scale, the fact that the scale can be used in both respondent-centred (how responses differ between people) and stimulus-centred (how responses differ between various stimuli) studies, most appropriate to glean data in support of the research problem in question (Emory and Cooper 1995:180-181). The advantages in using the popular Lickert scale according to Emory and Cooper (1995:180-181) are:

- Easy and quick to construct.
- Each item meets an empirical test for discriminating ability.
- The Lickert scale is probably more reliable than the Thurston scale, and it provides a greater volume of data than the Thurston differential scale.
- The Lickert scale is also treated as an interval scale.

Remenyi, Money and Twite (2005:224), are of the opinion that interval scales facilitate meaningful statistics when calculating means, standard deviation and Pearson correlation coefficients.

4.7 THE DEMAND FOR A QUALITATIVE RESEARCH STRATEGY

While this author acknowledges that a number of strategies can be applied to similar research projects, the well-known concepts of objectivity, reliability etcetera, inherited from the empirical analytical paradigm, is suggested for business research in more or less the traditional way. Quoting Thorndike & Hagen, these concepts are defined by Emory & Cooper (1995:156), as follows:

- **Practicality:** Practicality is concerned with a wide range of factors of economy, convenience, and interpretability.
- **Validity:** Validity refers to the extent to which a test measures what we actually wish to measure. Yin (1994:34), identifies 3 subsets to the concept validity, namely: Construct validity, internal validity and external validity.
- **Reliability:** Reliability has to do with the accuracy and precision of a measurement procedure.

4.8 SURVEY SENSITIVITY

Research conducted in areas of a sensitive nature as in the case of this survey, pose particular challenges to the researcher. The following guidelines from various academics serve to illustrate the mitigation process, which can be deployed in an instance where research is conducted in areas of a sensitive nature:

- A qualitative investigation of a particularly sensitive nature conducted by Oskowitz & Meulenberg-Buskens (1997:83), qualified the importance of handling mission critical issues as identified above when the authors stated: "Thus any type of qualitative investigation could benefit from the researchers being skilled and prepared, and the sensitive nature of an investigation into a stigmatizing condition made the need for such an undertaking even more imperative in the current study".
- The sensitivity of certain issues and issues identified as impacting the research negatively in the environments being evaluated, not only demand intimate personal involvement, but also demand the 'personal and practical experience' of the researcher. This view was upheld by Meulenberg-Buskens (1997:83), as being imperative to assure quality in qualitative research being undertaken. Checkland (1989:152), supports this view however extends the concept with the opinion that: "The researcher becomes a participant in the action, and the process of change itself becomes the subject of research".

4.9 SURVEY DESIGN

Collis and Hussey (2003:60-66), are of the opinion that, 'if research is to be conducted in an efficient manner and make the best of opportunities and resources available, it must be organised. Furthermore, if it is to provide a

coherent and logical route to a reliable outcome, it must be conducted systematically using appropriate methods to collect and analyse the data. A survey should be designed in accordance with the following stages:

- **Stage one:** Identify the topic and set some objectives.
- **Stage two:** Pilot a questionnaire to find out what people know and what they see as the important issues.
- **Stage three:** List the areas of information needed and refine the objectives.
- **Stage four:** Review the responses to the pilot.
- **Stage five:** Finalise the objectives.
- **Stage six:** Write the questionnaire.
- **Stage seven:** Re-pilot the questionnaire.
- **Stage eight:** Finalise the questionnaire.
- **Stage nine:** Code the questionnaire.

The survey design to be used in this instance is that of the descriptive survey as opposed to the analytical survey. The descriptive survey is according to Collis and Hussey (2003:60-66), frequently used in business research in the form of attitude surveys.

The statements within the survey have been designed with the following principles in mind:

- Avoidance of double-barrelled statements.
- Avoidance of double-negative statements.
- Avoidance of prestige bias.
- Avoidance of leading statements.
- Avoidance of the assumption of prior knowledge.

4.10 VALIDITY AND RELIABILITY ISSUES

It is the view of Yin (1994), Janesick (1998) and Donmoyer (cited in Janesick, 1998) that a fatal flaw in doing case studies is to conceive of statistical generalization as a method of generalizing the results of the case. This flaw exists because cases are not 'sampling units' and should not be chosen for this reason. The researcher thus acknowledges that results obtained from the research should not be generalized. According to Babbie (2005:285), survey research is generally weak on validity and strong on reliability. According to Denzin (1998:328), qualitative research is biased, because interpretation

produces understandings, which are shaped by class, gender, race, and ethnicity. Malterud (1998:329-330) expresses the view that qualitative research presents a perspective that is always partial, and findings that represent only a temporary and limited view. The researcher also acknowledges that descriptions and explanations involve selective viewing and interpretation, and that they cannot be neutral, objective or total (Mason, 1996:6).

4.11 THE VALIDATION SURVEY QUESTIONS / STATEMENTS

The following survey questions were posed to the selected sample:

Question 1: Implementation of ISO 9000 and Total Quality Management systems will enhance ineffective processes at this organisation.

Question 2: Organizational transformation will improve the reputation of the organization as an industry service provider.

Question 3: Ineffective processes within an organization impact its reputation as a service provider.

Question 4: Implementation of ISO 9000 and Total Quality Management does enhance organization's competitive advantage.

Question 5: Total Quality Management is compatible with ISO 9000 and facilitates its implementation.

Question 6: Quality management practices influence organization's performance measures.

Question 7: This organization often collect, analyze and act on customer information.

Question 8: Developing an intimate understanding of customer needs and competitor's customers to predict future customer behavior is one of strategic priorities of this organization.

Question 9: Preventing defective products or services is a strong attitude in this organization.

Question 10: The processes used in this organization do not include in-process measures of quality.

Question 11: The processes for designing new products or services ensure quality.

Question 12: Employees know how to use statistical process control (SPC) methods to evaluate their work processes.

Question 13: Explaining the variation in processes is rarely used as an analysis technique in this organization.

Question 14: In this organization, numerical quotas are the only measure of an employee's performance.

Question 15: Top management is responsible to such extent in supporting the change of organizational culture, towards adopting ISO 9000 and Total Quality Management.

Question 16: Managers and supervisors understand how to motivate employees
to achieve high performance.

Question 17: Implementation of a bureaucratic business hierarchy benefit an organization more compared to centralized power business hierarchy.

Question 18: Senior executive generally consider the total costs of products / services when making decision.

Question 19: This organization encourages continual study and improvement of its products / services and processes.

Question 20: Employees usually do not get an opportunity to suggest changes or modifications to existing processes.

Question 21: The majority of our products/services have been improved in the last year.

Question 22: This organization has received compliments and/or recognition for improving its products/services.

Question 23: All employees are committed to improving the quality of products / services and/or processes.

Question 24: Management throughout the organization stresses continuous improvement.

4.12 CONCLUSION

In this chapter, the survey design and methodology was elaborated upon. Data gleaned from this survey will be analysed and interpreted in the next chapter using descriptive and inferential statistics.

CHAPTER 5: DATA ANALYSIS AND INTERPRETATION OF RESULTS

5.1 INTRODUCTION

Data analysis is 'The process of bringing order, structure and meaning to the mass of collected data' (De Vos 2002:339). This chapter discusses the results of the survey conducted at SAF. The aim is to determine the extent of ineffeciences at SAF and how this could be mitigated. The data obtained from the completed questionnaires will be presented and analysed by means of inferential and descriptive statistics.

The data has been analysed by using SAS software. As descriptive statistics, frequency tables are displayed in Paragraph 5.2, which shows the distributions of the statement responses. Descriptive statistics is used to summarise the data. As a measure of central tendency and dispersion, Table 5.3 shows the means and standard deviation of all the statements.

5.2 ANALYSIS METHOD

5.2.1 Validation survey results

A descriptive analysis of the survey results returned by the research questionnaire respondents are reflected below. The responses to the questions obtained through the questionnaires are indicated in table format for ease of reference. Each variable is tested to fall within the boundaries. The database in which the data is captured was developed so that data validation is insured. That is; build in boundaries and rules so as to ensure data validity. Other measures to insure data validity, was to capture the information twice and then compare to see whether any mistakes were made and correct it. Data validation is the process of ensuring that a program operates on clean, correct and useful data. The construct validation however can only be taken to the point where the questionnaire measure what it is suppose to measure.

5.2.2 Data format

The data returned from the questionnaires was coded according to a predetermined coding scheme and captured on Microsoft Access. It was then imported into SAS-format through the SAS ACCESS module. This information was then analysed and interpreted.

5.2.3 Preliminary analysis

The reliability of the statements in the questionnaire posed to the sample respondents drawn from SAF were tested by using the Cronbach Alpha tests. (See paragraph 5.3.1). It is of importance to note that an established (industry proven) questionnaire was used 'Total Quality Management and ISO 9000' questionnaire. Descriptive statistics was performed on all variables; displaying means, standard deviations, frequencies, percentages, cumulative frequencies and cumulative percentages. These descriptive statistics are discussed in Paragraphs 5.3.2 and 5.3.3. (See also computer printout reflected in Annexure B).

5.2.4 Inferential statistics

The following inferential statistics are performed on the data:

- Cronbach Alpha test.
- ANOVA for comparison of means between management and staff members.
- Mann-Whitney U-test for two independent samples.

5.2.5 Technical report with graphical displays

A written report with explanations of all variables and their outcomes were then compiled. A Cross analysis of variables where necessary was performed, attaching statistical probabilities to indicate the magnitude of differences or associations. All inferential statistics are discussed in Paragraph 5.3.4.

5.2.6 Assistance to researcher

The conclusions made by the researcher, was validated by the statistical report. The final report statistical analysis was validated and checked by a qualified statistician to exclude any misleading interpretations.

5.2.7 Sample

The conclusions made by the researcher
The target population is the Engineering Department of SAF. The sample is selected on the basis of a probability sample. The original sample selected was:

- 3 Directors;
- 16 Managers / Supervisors and
- 30 Staff members.

Of the above, the following respondants responded to the questionnaire:

- 2 Directors;
- 11 Managers; and
- 21 Staff members.

5.3 ANALYSIS

5.3.1 Reliability testing

Cronbach's Alpha is an index of reliability associated with the variation accounted for by the true score of the "underlying construct". Construct is the hypothetical variables that are being measured (Cooper & Schindler, 2003:216-217). More specific, Cronbach's alpha measures how well a set of items (or variables) measures a single uni-dimensional latent construct.

The reliability test (Cronbach's Alpha Coefficient) was executed on all the items (statements), which represent the measuring instrument of this survey, with respect to the responses rendered in this questionnaire. The results are represented in Table 5.1. Negative phrased questions were reversed scored. These questions are indicated with an "n" on the end. These statements were negatively put, and to adjust for double negative if respondents disagree on an already negative question it gives a positive; it was transformed by subtracting 7 from the value it takes, thus makes the positive perception,

negative and the negative perception, positive. These questions can then be changed to positive phrased questions as indicated in the next table.

TABLE 5. 1: Cronbach's Alpha Coefficients.

Statements	Variable nr.	Correlation with total	Cronbach's Alpha Coefficient
1. Implementation of ISO 9000 and Total Quality Management systems will enhance ineffective processes at this organization.	Q01	0.4222	0.8122
2. Organizational transformation will improve the reputation of the organization as an industry service provider.	Q02	0.2163	0.8194
3. Ineffective processes within an organization impact its reputation as a service provider.	Q03	0.1814	0.8223
4. Implementation of ISO 9000 and Total Quality Management does enhance organization's competitive advantage.	Q04	0.0738	0.8262
5. Total Quality Management is compatible with ISO 9000 and facilitates its implementation.	Q05	0.3820	0.8140
6. Quality management practices influence organization's performance measure.	Q06	0.4289	0.8116
7. This organization often collect, analyze and act on customer information.	Q07	0.3861	0.8134
8. Developing intimate understanding of customer needs and competitor's customers to predict future customer behaviour is one of strategic priorities of this organization.	Q08	0.3072	0.8166
9. Preventing defective products or services is a strong attitude in this organization.	Q09	0.7047	0.7995
10. The processes used in this organization do include in-process measures of quality.	Q10n	0.0558	0.8343
11. The processes for designing new products or services ensure quality.	Q11	0.5733	0.8097
12. Employees know how to use statistical process control (SPC) methods to evaluate their work processes.	Q12	0.4602	0.8094
13. Explaining the variation in processes is mostly used as an analysis technique in this organization.	Q13n	0.2552	0.8190
14. In this organization, numerical quotas are the only measure of an employee's performance.	Q14	0.2178	0.8204
15. Top management is responsible to such extent in supporting the change of organizational	Q15	0.6414	0.8020

Statements	Variable nr.	Correlation with total	Cronbach's Alpha Coefficient
culture, towards adopting ISO 9000 and Total Quality Management.			
16. Managers and supervisors understand how to motivate employees to achieve high performance.	Q16	0.6398	0.7993
17. Implementation of bureaucratic business hierarchy benefit an organization more compared to centralized power business hierarchy.	Q17	0.2172	0.8202
18. Senior executives generally consider the costs of products/services when making decisions.	Q18	0.0627	0.8232
19. This organization encourages continual study and improvements of its products/services and processes.	Q19	0.6901	0.8007
20. Employees usually do get an opportunity to suggest changes or modifications to existing processes.	Q20n	0.1772	0.8226
21. The majority of our products/services have been improved in the last year.	Q21	0.4179	0.8132
22. This organization has received compliments and/or recognition for improving its products/ services.	Q22	0.2703	0.8184
23. All employees are committed to improving the quality of products/services and/or processes.	Q23	0.5584	0.8034
24. Management throughout the organization stresses continuous improvement.	Q24	0.5775	0.8033
Cronbach's Coefficient Alpha for standardized variable			**0.8271**
Cronbach's Coefficient Alpha for raw variables			**0.8206**

According to the Cronbach's Alpha Coefficients (Table 5.1) for all the items in the questionnaire:

- 0.8206 for raw variables; and
- 0.8271 for standardized variables;

These coefficients were more than the acceptable level of 0.70, which proves the questionnaire to be reliable and consistent.

5.3.2 Descriptive statistics

Table 5.2 shows the descriptive statistics for all the variables in the questionnaire measuring Organization transformation using Total Quality

Management and ISO 9000 with the frequencies in each category and the percentage out of total number of questionnaires. It is of importance to note that the descriptive statistics are based on the total sample. In some cases there were no answers given (left blank) in the questionnaire. These are shown as "unknown". These descriptive statistics are also shown in Annexure B.

TABLE 5. 2: Descriptive statistics for categorical variables

Variables	Categories	Frequency	Percentage out of total
1. Position:	Director	2	5.9%
	Manager	11	32.4%
	Staff	21	61.8%
ORGANIZATIONAL TRANSFORMATION STATEMENTS			
1. Implementation of ISO 9000 and Total Quality Management systems will enhance ineffective processes at this organization.	Strongly disagree	0	0.0%
	Disagree	3	8.8%
	Somewhat disagree	0	0.0%
	Somewhat agree	5	14.7%
	Agree	14	41.2%
	Strongly agree	11	32.4%
	Unknown	1	2.94%
2. Organizational transformation will improve the reputation of the organization as an industry service provider.	Strongly disagree	0	0.0%
	Disagree	0	0.0%
	Somewhat disagree	2	5.9%
	Somewhat agree	7	20.6%
	Agree	16	47.1%
	Strongly agree	9	26.5%
	Unknown	0	0.0%
3. Ineffective processes within an organization impact its reputation as a service provider.	Strongly disagree	1	2.9%
	Disagree	0	0.0%
	Somewhat disagree	1	2.9%
	Somewhat agree	7	20.6%
	Agree	12	35.3%
	Strongly agree	13	38.2%
	Unknown	0	0.0%
4. Implementation of ISO 9000 and Total Quality Management	Strongly disagree	1	2.9%
	Disagree	0	0.0%

Variables	Categories	Frequency	Percentage out of total
does enhance organization's competitive advantage.	Somewhat disagree	0	0.0%
	Somewhat agree	5	14.7%
	Agree	16	47.1%
	Strongly agree	12	35.3%
	Unknown	0	0.0%
5. Total Quality Management is compatible with ISO 9000 and facilitates its implementation.	Strongly disagree	0	0.0%
	Disagree	0	0.0%
	Somewhat disagree	2	2.9%
	Somewhat agree	6	17.6%
	Agree	18	52.9%
	Strongly disagree	8	23.5%
	Unknown	0	0.0%
6. Quality management practices influence organization's performance measure.	Strongly disagree	1	2.9%
	Disagree	0	0.0%
	Somewhat disagree	1	2.9%
	Somewhat agree	5	14.7%
	Agree	19	55.9%
	Strongly agree	8	23.5%
	Unknown	0	0.0%
7. This organization often collect, analyze and act on customer information.	Strongly disagree	1	2.9%
	Disagree	2	5.9%
	Somewhat disagree	5	14.7%
	Somewhat agree	14	41.2%
	Agree	9	26.5%
	Strongly agree	3	8.8%
	Unknown	0	0.0%
8. Developing intimate understanding of customer needs and competitor's customers to predict future customer behaviour is one of strategic priorities of this organization.	Strongly disagree	1	2.9%
	Disagree	0	0.0%
	Somewhat disagree	3	8.8%
	Somewhat agree	10	29.4%
	Agree	13	38.2%
	Strongly agree	6	17.6%
	Unknown	1	2.9%
9. Preventing defective products	Strongly disagree	0	0.0%

Variables	Categories	Frequency	Percentage out of total
or services is a strong attitude in this organization.	Disagree	1	2.9%
	Somewhat disagree	5	14.7%
	Somewhat agree	4	11.8%
	Agree	14	41.2%
	Strongly agree	10	29.4%
	Unknown	0	0.0%
10. The processes used in this organization do include in-process measures of quality.	Strongly disagree	0	0.0%
	Disagree	8	23.5%
	Somewhat disagree	9	26.5%
	Somewhat agree	3	8.8%
	Agree	5	14.7%
	Strongly agree	8	23.5%
	Unknown	1	2.9%
11. The processes for designing new products or services ensure quality.	Strongly disagree	0	0.0%
	Disagree	1	2.9%
	Somewhat disagree	1	2.9%
	Somewhat agree	13	38.2%
	Agree	14	41.2%
	Strongly agree	4	11.8%
	Unknown	1	2.9%
12. Employees know how to use statistical process control (SPC) methods to evaluate their work processes.	Strongly disagree	3	8.8%
	Disagree	5	14.7%
	Somewhat disagree	7	20.6%
	Somewhat agree	12	35.3%
	Agree	4	11.8%
	Strongly agree	3	8.8%
	Unknown	0	0.0%
13. Explaining the variation in processes is mostly used as an analysis technique in this organization.	Strongly disagree	0	0.0%
	Disagree	7	20.6%
	Somewhat disagree	16	47.1%
	Somewhat agree	5	14.7%
	Agree	3	8.8%
	Strongly agree	2	5.9%
	Unknown	1	2.9%

Variables	Categories	Frequency	Percentage out of total
14. In this organization, numerical quotas are the only measure of an employee's performance.	Strongly disagree	1	2.9%
	Disagree	6	17.6%
	Somewhat disagree	6	17.6%
	Somewhat agree	14	41.2%
	Agree	6	17.6%
	Strongly agree	0	0.0%
	Unknown	1	2.9%
15. Top management is responsible to such extent in supporting the change of organizational culture, towards adopting ISO 9000 and Total Quality Management.	Strongly disagree	0	0.0%
	Disagree	0	0.0%
	Somewhat disagree	5	14.7%
	Somewhat agree	7	20.6%
	Agree	14	41.2%
	Strongly agree	8	23.5%
	Unknown	0	0.0%
16. Managers and supervisors understand how to motivate employees to achieve high performance.	Strongly disagree	2	5.9%
	Disagree	3	8.8%
	Somewhat disagree	7	20.6%
	Somewhat agree	9	26.5%
	Agree	8	23.5%
	Strongly agree	5	14.7%
	Unknown	0	0.0%
17. Implementation of bureaucratic business hierarchy benefit an organization more compared to centralized power business hierarchy.	Strongly disagree	1	2.9%
	Disagree	1	2.9%
	Somewhat disagree	4	11.8%
	Somewhat agree	16	47.1%
	Agree	11	32.4%
	Strongly agree	1	2.9%
	Unknown	0	0.0%
18. Senior executives generally consider the costs of products/services when making decisions.	Strongly disagree	0	0.0%
	Disagree	0	0.0%
	Somewhat disagree	1	2.9%
	Somewhat agree	7	20.6%
	Agree	22	64.7%
	Strongly agree	4	11.8%

Variables	Categories	Frequency	Percentage out of total
	Unknown	0	0.0%
19. This organization encourages continual study and improvements of its products/services and processes.	Strongly disagree	0	0.0%
	Disagree	0	0.0%
	Somewhat disagree	5	14.7%
	Somewhat agree	12	35.3%
	Agree	10	29.4%
	Strongly agree	7	20.6%
	Unknown	0	0.0%
20. Employees usually do get an opportunity to suggest changes or modifications to existing processes.	Strongly disagree	1	2.9%
	Disagree	5	14.7%
	Somewhat disagree	10	29.4%
	Somewhat agree	9	26.5%
	Agree	7	20.6%
	Strongly agree	2	5.9%
	Unknown	0	0.0%
21. The majority of our products/services have been improved in the last year.	Strongly disagree	0	0.0%
	Disagree	1	2.9%
	Somewhat disagree	10	29.4%
	Somewhat agree	15	44.1%
	Agree	7	20.6%
	Strongly agree	0	0.0%
	Unknown	0	0.0%
22. This organization has received compliments and/or recognition for improving its products/ services.	Strongly disagree	1	2.9%
	Disagree	2	5.9%
	Somewhat disagree	5	14.7%
	Somewhat agree	11	32.4%
	Agree	10	29.4%
	Strongly agree	4	11.8%
	Unknown	1	2.9%
23. All employees are committed to improving the quality of products/services and/or processes.	Strongly disagree	1	2.9%
	Disagree	5	14.7%
	Somewhat disagree	5	14.7%
	Somewhat agree	6	17.6%
	Agree	10	29.4%

Variables	Categories	Frequency	Percentage out of total
	Strongly agree	7	20.6%
	Unknown	0	0.0%
24. Management throughout the organization stresses continuous improvement.	Strongly disagree	2	5.9%
	Disagree	1	2.9%
	Somewhat disagree	3	8.8%
	Somewhat agree	11	32.4%
	Agree	10	29.4%
	Strongly agree	7	20.6%
	Unknown	0	0.0%

5.3.3 Uni-variate graphs

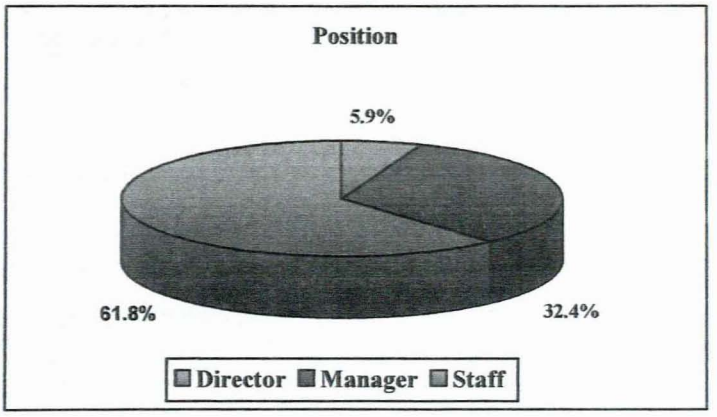

FIGURE 5. 1: Pie with 3D visual effect for Position in Organization

Figure 5.1 shows the distribution of respondents that responded on the questionnaire for position in the organisation.

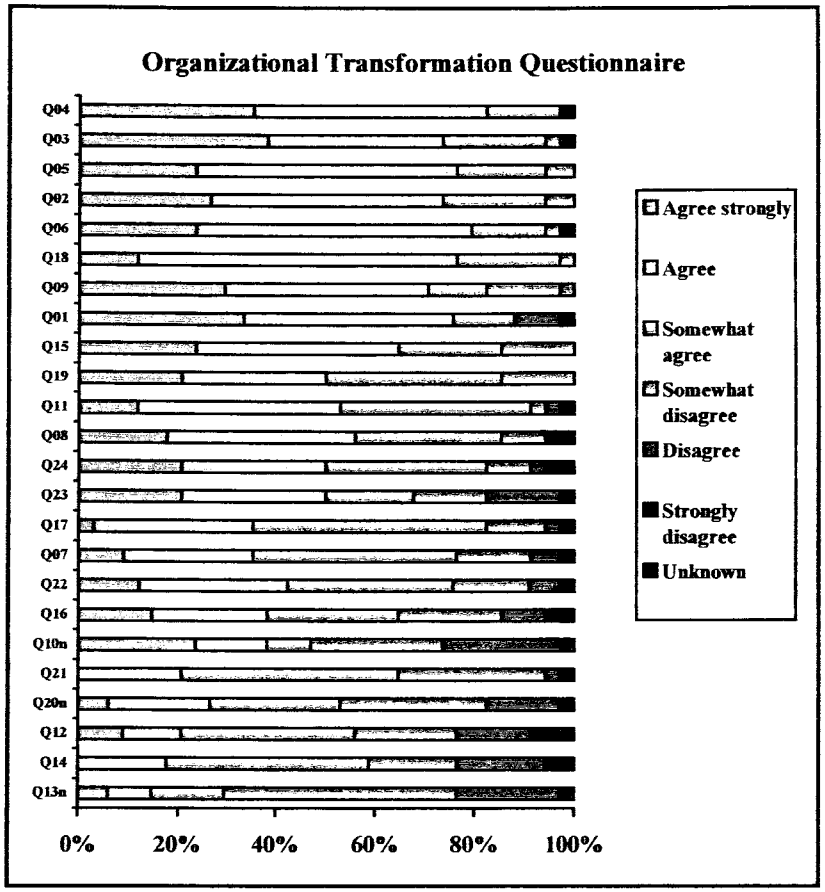

FIGURE 5. 2: 100% stack bar for organizational transformation statements

The statements are sorted from the most positive response on the statement to the least positive response and then represented in Figure 5.2. Overall most of the respondents agreed with all of the statements to some degree. The statements with a positive outcome over eighty percent were:

- "Implementation of ISO 9000 and Total Quality Management does enhance organization's competitive advantage." (97.1% agreed to some degree).
- "Ineffective processes within an organization impact its reputation as a service provider." (94.1% agreed to some degree).
- "Total Quality Management is compatible with ISO 9000 and facilitates its implementation." (94.1% agreed to some degree).
- Organizational transformation will improve the reputation of the organization as an industry service provider." (94.1% agreed to some degree).
- "Quality management practices influence organization's performance measure." (94.1% agreed to some degree).

- "My Senior executives generally consider the costs of products/services when making decisions." (97.1% agreed to some degree).
- "Preventing defective products or services is a strong attitude in this organization." (82.4% agreed to some degree).
- "Implementation of ISO 9000 and Total Quality Management systems will enhance ineffective processes at this organization." (90.9% agreed to some degree).
- "Top management is responsible to such extent in supporting the change of organizational culture, towards adopting ISO 9000 and Total Quality Management." (85.3% agreed to some degree).
- "This organization encourages continual study and improvements of its products/services and processes." (85.3% agreed to some degree).
- "The processes for designing new products or services ensure quality." (93.9% agreed to some degree).
- "Developing intimate understanding of customer needs and competitor's customers to predict future customer behaviour is one of strategic priorities of this organization." (87.9% agreed to some degree).
- "Management throughout the organization stresses continuous improvement." (82.4% agreed to some degree).
- "Implementation of bureaucratic business hierarchy benefit an organization more compared to centralized power business hierarchy." (82.4% agreed to some degree).

5.3.4 Comparative statistic

A comparison is made between the responses of management and staff members. Managers and Directors are grouped together and their mean response was compared to the mean response of the staff members by using the Analysis of Variance test. Because doubt exists whether the distribution is a parametric distribution the Mann Whitney U-test, a distribution-free non-parametric test was also used for comparing the central tendency of the two independent samples (managers and staff). All the statistically significant differences are discussed in this paragraph and all the tests are shown in Annexure C.

The responses of management and the staff members of SAF were the same for all the statements except for statement 17. The Staff agreed more than Management that "Implementation of a bureaucratic business hierarchy

- By better management of processes the organisational performance will improve automatically.
- One of the objectives to implement ISO 9000 is to enable an organisation to consistently produce products and services that meet customer requirements.
- The second objective is to improve competitive advantage.

6.3 THE RESEARCH HYPOTHESIS STATEMENTS RE-VISITED

The research hypothesis statement, which formed the crux of this dissertation, reads as follows:

(H_o) Implementation of ISO 9000 and Total Quality Management will improve ineffective processes at SAF Engineering, thus improving organizational transformation and enhance the reputation of the organization as an industry service provider.

(H_i) Implementation of ISO 9000 and Total Quality Management will not improve ineffective processes at SA Five Engineering, thus not improving organizational transformation and not enhance the reputation of the organization as an industry service provider.

In the organisational transformation survey (Chapter 5) and literature review conducted within the ambit of Chapter 3, there is concluding evidence that ineffective processes impact adversely on organisational transformation and the reputation such an organisation has as a service provider. As a result the null hypothesis (H_o) is accepted and the alternative hypothesis (H_i) rejected. Furthermore, the literature study has shown that the implementation of ISO 9000 and Total Quality Management:

- Will improve ineffective processes within SAF.
- Will improve organisational transformation.
- Will enhance the reputation of the organization.

6.4 INVESTIGATIVE (SUB) QUESTIONS RE-VISITED

The investigative (sub) questions, which was researched within the ambit of this dissertation, reads as follows:

- Can the implementation of ISO 9000 and Total Quality Management enhance organization's competitive advantage?
- Is Total Quality Management compatible with ISO 9000 and facilitate its implementation?
- Do quality management practices influence organizational performance measures?
- To what extent is it top management responsibility to support the change of organizational culture towards adopting ISO 9000 and Total Quality Management?
- Does the implementation of a bureaucratic business hierarchy benefit an organization more if compared to centralized power business hierarchy?

The analysis of an organisational survey data and the literature review in Chapter 3 in view of this researcher provides conclusive answers to the above investigative questions.

6.5 SURVEY FINDINGS

For the purpose of completeness, the following findings resulted from the research survey:

- The implementation of ISO 9000 and Total Quality Management does enhance an organisation's competitive advantage.
- Ineffective processes within an organisation impact upon its reputation as a service provider.
- Total Quality Management is compatible with ISO 9000 and facilitates its implementation.
- Organisational transformation will improve the reputation of the organisation as an industry service provider.
- Quality management practices influence an organisation's performance measures.
- The senior executives of SAF generally consider the costs of products/services when making decisions pertaining to quality improvement.
- SAF supports strategies, which prevents defective products or services.
- Implementation of ISO 9000 and TQM systems will enhance ineffective processes at SAF.
- Top management is responsible and support the change of organisational culture towards adopting ISO 9000 and TQM.

- SAF encourages continual study and improvements of its products/services and processes.
- The processes for designing new products or services ensure quality.
- Developing an intimate understanding of customer needs and competitor's customers to predict future customer behaviour is one of strategic priorities of SAF.
- Management throughout SAF stresses continuous improvement.

6.6 RECOMMENDATIONS

The following recommendations are made to mitigate the research problem:

- Implement a process to enforce a process approach and continual process improvement.
- Nominate personnel to manage the process in place and measure its effectiveness in continual improvement.
- Management should conduct management review meetings relating to process and continual improvement with the ultimate aim of satisfying the customers.
- Nominate internal quality auditors to perform monthly audits to enforce ISO 9000 requirements.
- Implement processes to:
  - Collect customer information to measure their satisfaction.
  - Provide good responses to customer enquiries.
  - Resolve customer complaints.
  - Design new products and services that will ensure quality.
- All employees should participate and be committed in improving SAF's products/services and processes.
- The organisation should work aggressively at reducing waste and continually decrease the amount of scrap.
- SAF need to ensure that the processes used are efficient in terms of converting inputs (labour, data, raw material) into desired outputs (products/services).
- Management should encourage and stress continual study and improvement of the organizational products and services.

6.7 CONCLUSION

The researcher has shown that organisations could significantly benefit from implementing ISO 9000 followed thereafter by a TQM implementation. Furthermore, both in the instance of ISO 9000 but in particular in the instance of TQM should the organisation on a sustained basis establish a culture of continued improvement to transform the organisation.

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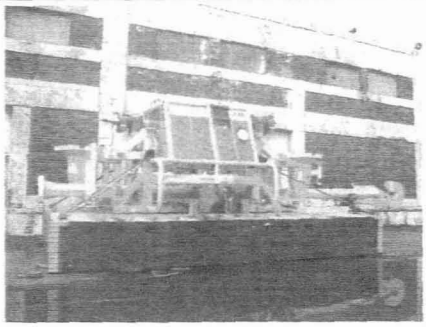
Annexure A: Details of SA Five Engineering Projects as reflected by Cooper (2008:On line).

SUPPLY OF FTA'S & ILT'S (BP GREATER PLUTONIO)



Client: **TECHNIP**
Date: Sept 05 to Nov 06
Contract: Lump Sum
Facilities: A Berth & Blackheath
Value: 3 Million Euros

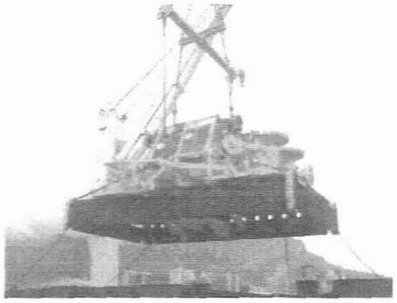
Project Scope

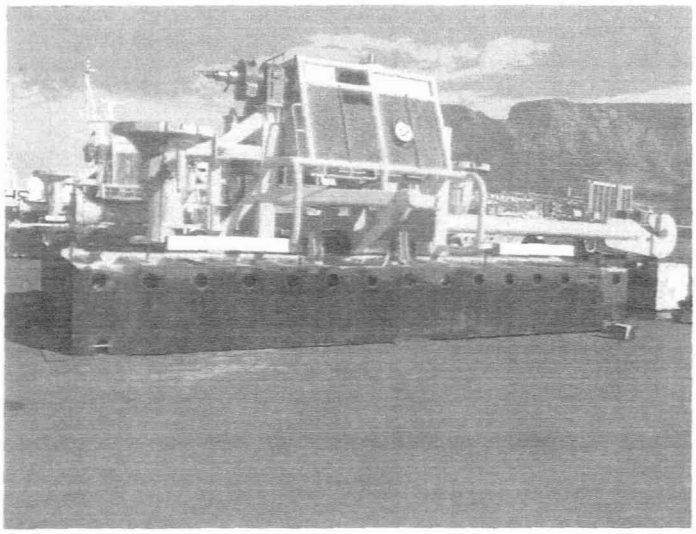
Supply of 16 Water Injection Flow-line Termination Assemblies (FTAs) & Inn line Tee Assemblies (ILTs) for the Greater Plutonio Development Project, Angola. The Technip FTA's & ILT's are Sub-Sea Structures comprising Inconel clad pipeline systems (comprising pipe sections, tees, valves, actuators and connectors) supported by frames made of square tubular systems sliding on a fixed box skirt mud mat.

Fabrication Work: Approximately 450 Tons

Scope of Work:

Construction Engineering; Procurement; Fabrication; Non-Destructive Testing (NDT); Painting; Cathodic Protection; Factory Acceptance Test (FAT); Load Out; As Built Documentation





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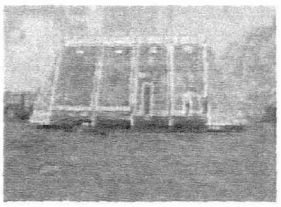
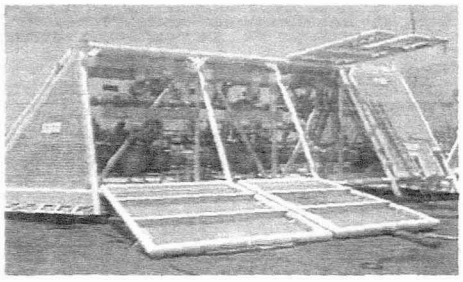
SUBSEA STRUCTURES - PLEM - LATERALS (RSA)

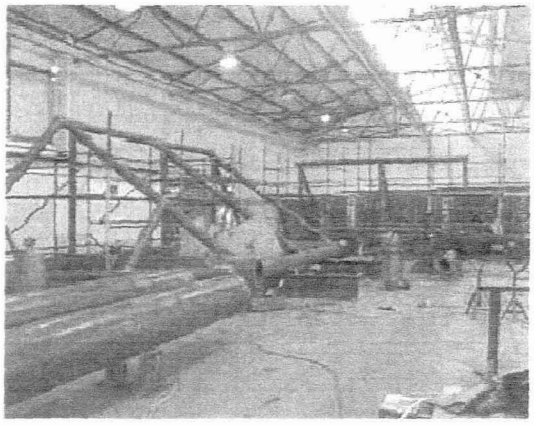
Client: **DRESSER KELLOGG SA**
Date: November 99 - December 2000
Facilities: "A" Berth & Blackheath
Location: Offshore Mossel Bay
Value: Three Million Rand





Project Scope

Project and Manage Procurement, fabrication, testing and pre-commissioning of one Pipeline End Manifold and 5 Lateral Connections between wellhead jumpers and pipeline.



Prefabrication of frames at Blackheath workshop, transportation to "A Berth" for final erection, painting, testing and pre-commissioning

Pipeline End Manifold (PLEM)

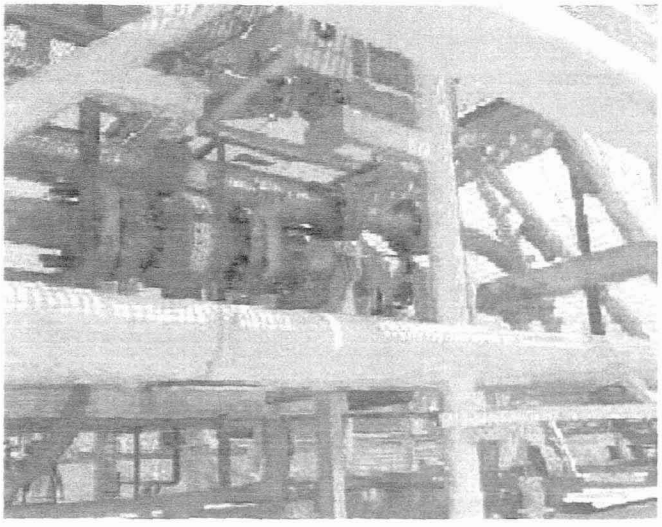
Total weight 108 tons including:

- Structural 24 tons
- Piping 46 tons
- Ballast 32 tons

Laterals Structures

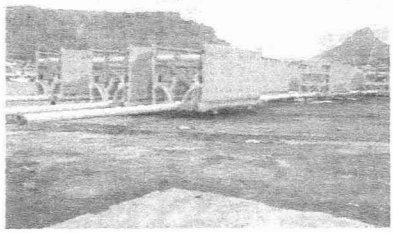
Five identical structures:

- Total weight of structure: 138 tons
- Total weight of piping: 121 tons



SUPPLY OF FLET'S & ITA'S (ROSA)

Client: **SAIPEM**
Date: March 05 to March 06
Contract: Lump Sum
Facilities: A Berth & Blackheath
Value: 6 Million Dollars



Project Scope

Supply of 14 Water Injection & 17 Production FLET & ITA's, 8 Service Line FLET's & 2 Launch Trolleys for the ROSA Development Project, Angola.

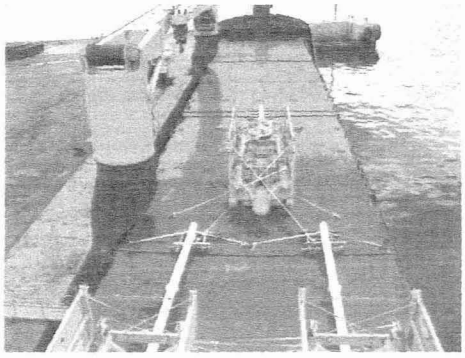
FLET's & ITA's are Sub-Sea Structures comprising an X65 pipeline system (made itself of a pipe section, bend and mechanical connector); a foundation system made of free fall hinged mud-mats & a tubular steel support frame.

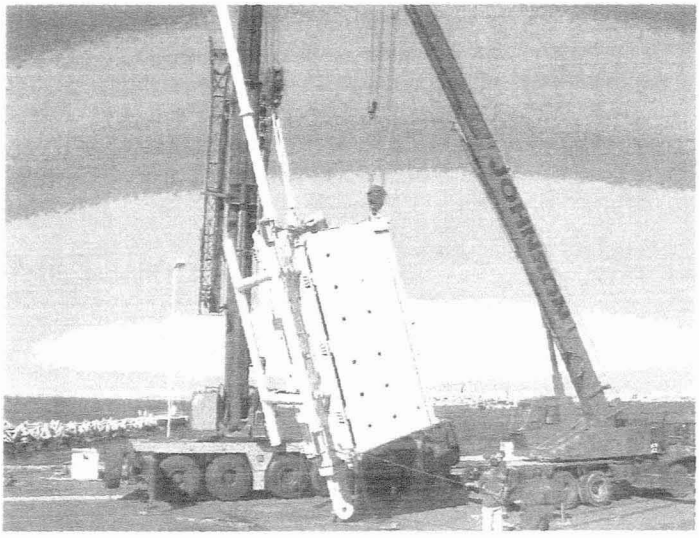
Fabrication Work:

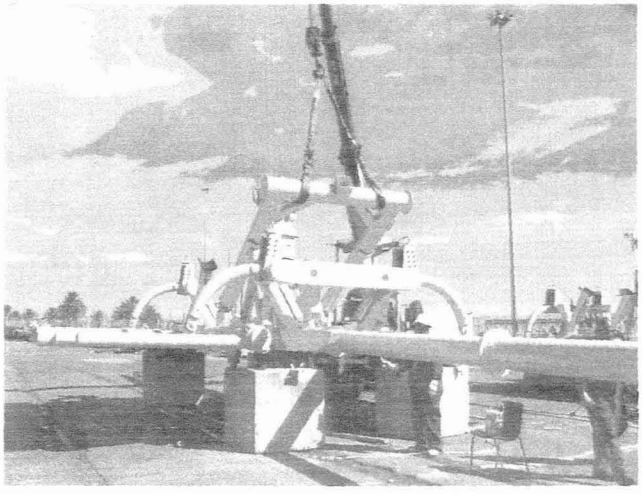
Approximately 600 Tons

Scope of Work:

Construction Engineering; Procurement; Fabrication; NDT; Painting; Wet Insulation; Cathodic Protection; FAT; Load Out; As Built Documentation

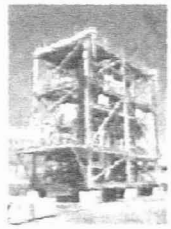






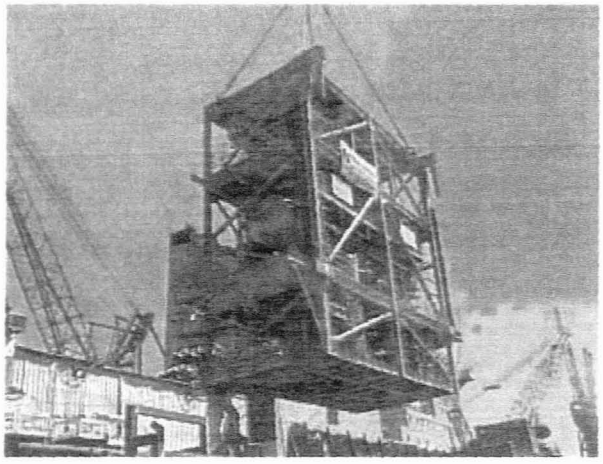
RO1 PROCESS MODULE (RSA)

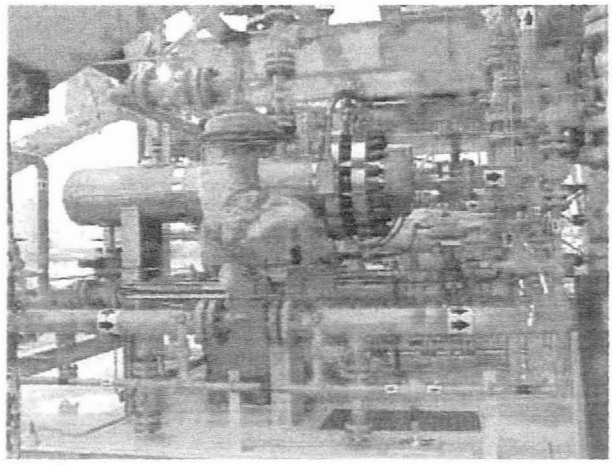
Client: **DRESSER KELLOGG SOUTH AFRICA**
Date: December 98 - October 1999
Facilities: "A" Berth & Blackheath
Location: Offshore, Mossel Bay
Value: Six Million Dollars



Project Scope

Project and Manage, Procurement, fabrication, testing and pre-commissioning of RO1 Process Module (slug catcher, hydrocylones, filters, pumps).





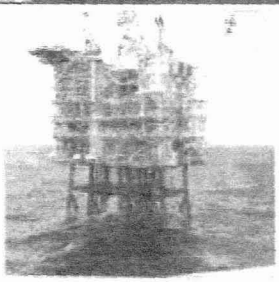
Prefabrication at Blackheath workshop of upper box (35 tons), transportation to A Berth using special wide load truck, where main structure was being fabricated (100 tons).
Assembly using the harbour floating crane, painting, testing and pre-commissioning before load out on board installation vessel.

Total weight: 360 tons including:

- Structural steel = 138 tons
- Piping = 90 tons (30 tons duplex)
- Mechanical = 120 tons
- Electrical/Instrumentation= 12tons

Lower Box ex Blackheath

FA PLATFORM MODIFICATIONS (RSA)



Client: **DRESSER KELLOGG SA**
Date: January 99 to January 2001
Contract Type: Reimbursable
Facilities: "A" Berth & Blackheath
Location: Offshore, Mosselbay, SA

Project Scope

Modifications of process elements of the existing FA Platform to accommodate production from new EM Field.

Structural Work:

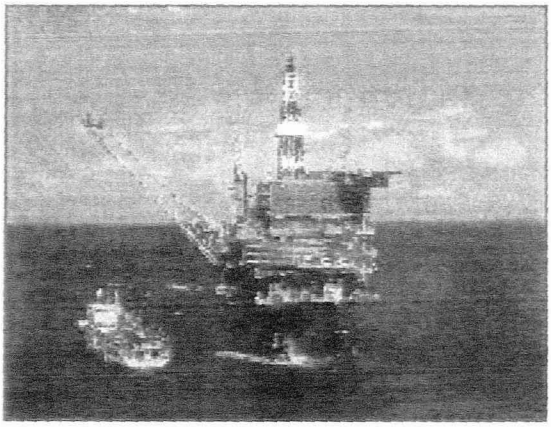
- Approximately 140 tons

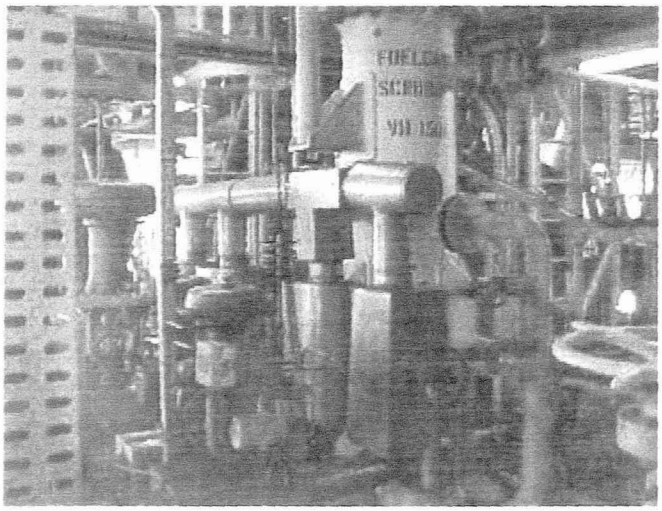
Piping Work:

- Approximately 170 tons
- Including 18 tons duplex

Elect/Instrumentation:

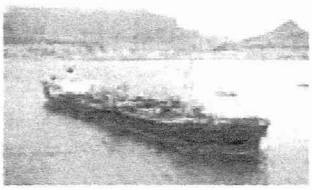
- Approximately 43 tons
- Total of 1 million man-hours





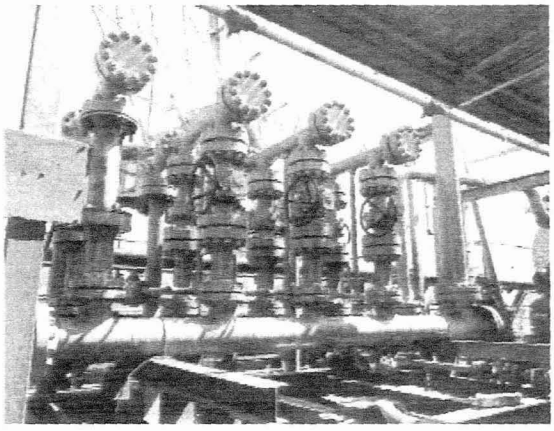
FPSO "OCEAN PRODUCER"

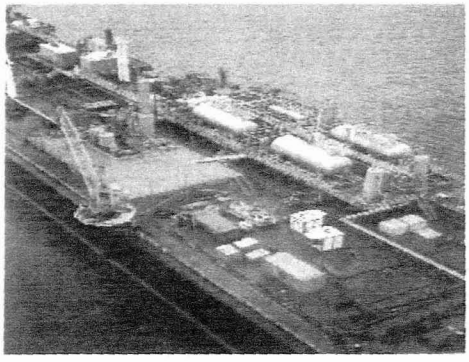
Client: **OCEANEERING (PTY) LTD**
Date: June To October 2001
Contract Type: Lump Sum
Facilities: "A" Berth" and Blackheath



Scope of Work

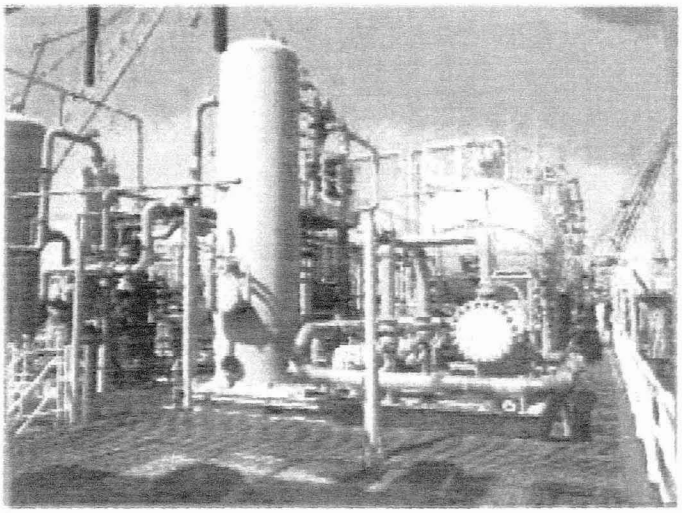
- Assistance to design, engineering and procurement of local and imported materials.
- Prefabrication in workshop.
- Full painting system.
- Erection on board FPSO.
- Pressure testing.

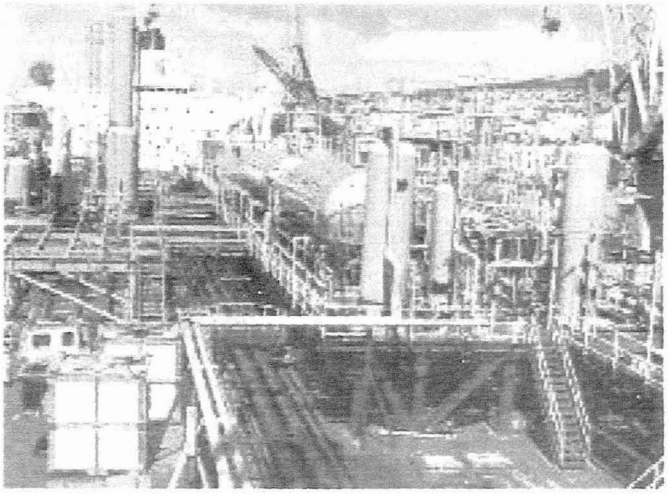




Project Description

- High pressure pipe work, schedule 40 to 160, rating 150 to 1500 Lbs.
- Carbon steel piping: +- 35 Tons
- GRP and Bond strand piping for seawater, water flood system.
- Distribution manifold and pipe spools from the Riser porch.

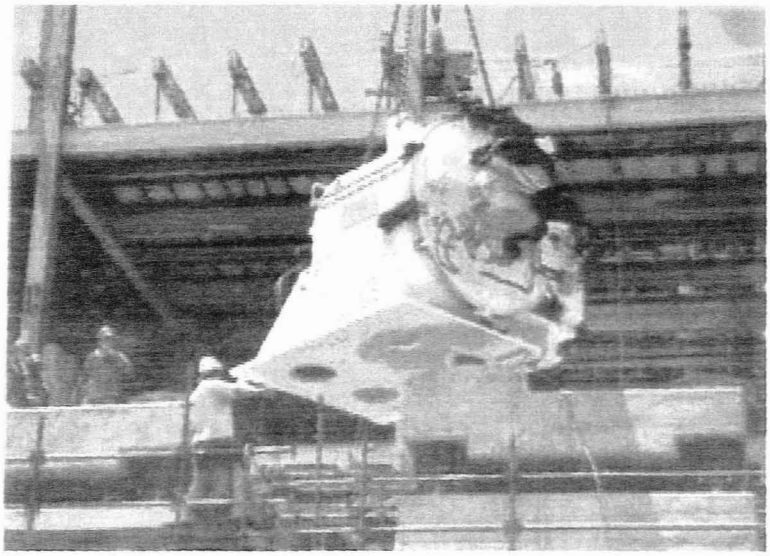




GREENFIELDS - MAIZE PLANT. PHASE I AND II

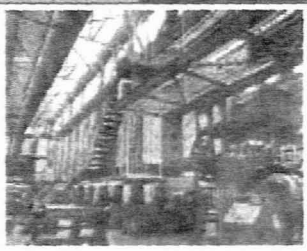
Client:	**AFRICAN PRODUCTS**
Location:	Johannesburg, South Africa
Date:	July 1996 to November 1997
Contract Type:	Lump Sum

Project Scope
Fabrication, erection of structures and piping, installation of equipment. Pre-fabrication on site and erection of 900 tons of piping (mainly stainless steel), 100 tons of support. Installation of 1,300 tons of mechanical equipment, testing and pre-commissioning



HIGH SPEED PRINTING PRESS

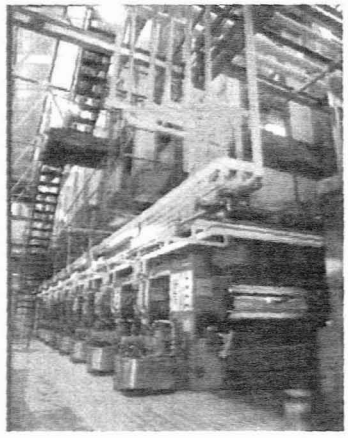
Client: **NASPERS**
Location: Cape Town, South Africa
Date: Completed February 1997
Contract Type: Lump Sum
Facility: Blackheath

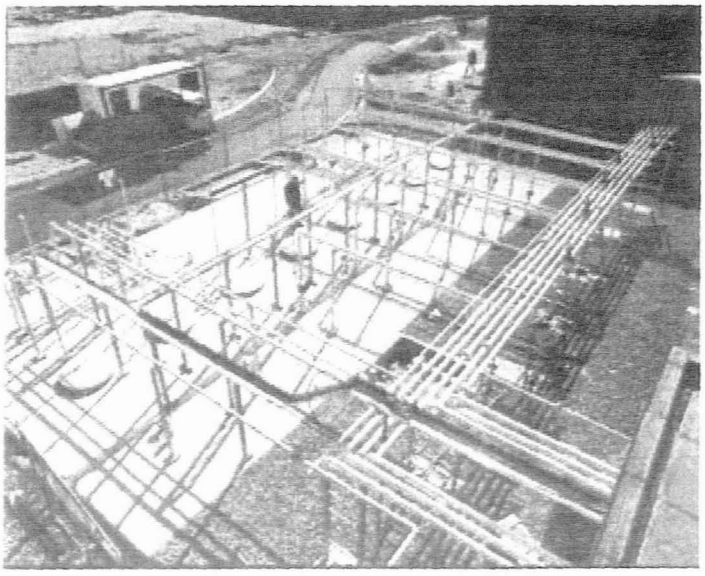


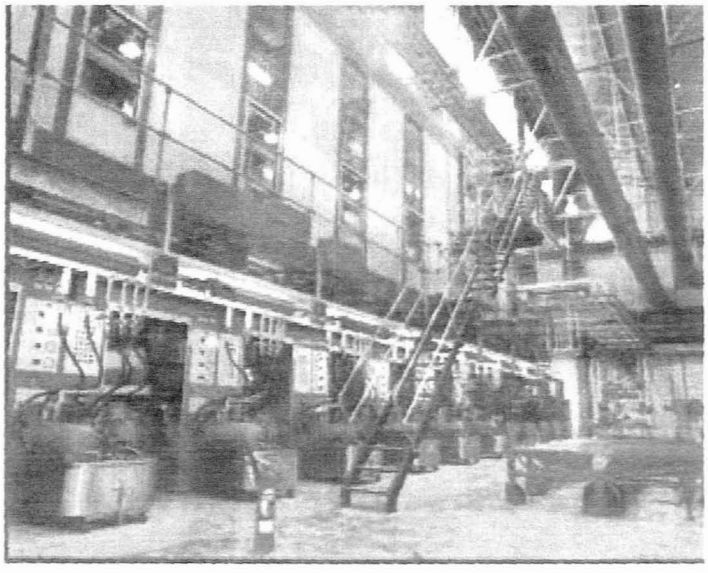
Project Scope

Removal/reinstallation of existing presses, assembly of new presses, fabrication and erection of reticulation piping and tanks.

Assembly and installation of imported new presses, installation of service lines, steam and condensate lines, ink lines, toluene lines. Removal of existing binder machines, and presses from old building, installation at new premises. Transfer of existing toluene tanks to new premises and construction of new toluene process plant.



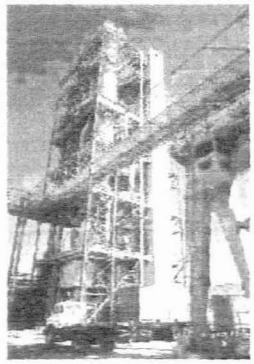




PET-2 PLANT

Client: **SANS FIBRES (PTY) LTD**
Location: Cape Town, South Africa
Date: April to October 2000
Contract Type: Lump Sum
Facility: Blackheath

Project Scope
Procurement, prefabrication, erection of large bore process piping. Installation and alignment of major equipments (crystallisers, fluid bed, pre-heater, vibrating screens)



Fabrication of large bore stainless steel process piping, (from BUHLER Drawings process designers) in Blackheath Workshop, transport to site for erection. Testing was a service test by systems through major equipment.

All major equipments were installed, levelled, secured and aligned.

Service piping (compressed air, instrument air, nitrogen, and potable water) all materials were processed and site run on the contract from P & ID Drawings.

The Pet-2 Tower: 43m high and consisted of 5 levels, majority of the major equipments and large bore process piping was above the 15m level. Procurement of 170m stainless steel Sch. 10 piping for chip transfer lines. Process piping = 450m +- 4 mm wall thickness, size range from 1000 mm to 150 mm average size 800 mm all stainless steel. Service piping consisted of 1236 m Carbon Steel Sch. 40 piping size range from 100 MB to 15 mm NB.

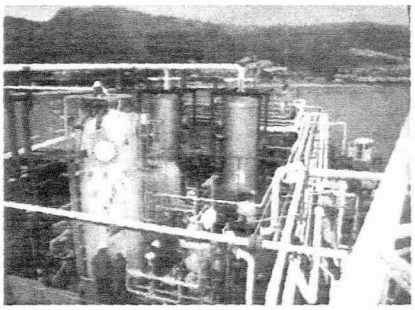
ORCA DRILLING RIG CONVERSION

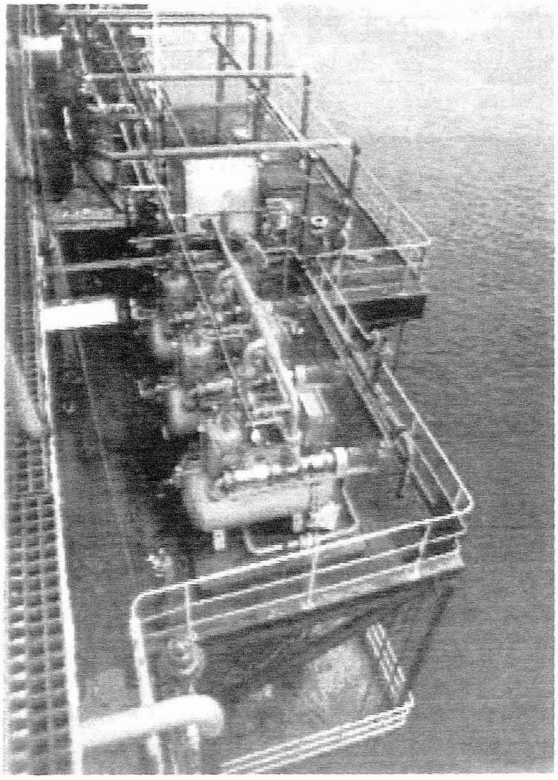
Client: **SCHLUMBERGER**
Location: Simonstown Harbour, South Africa
Date: November 1996

Project Scope

Fabrication, erection of piping.

Pre-fabrication at Blackheath Workshop, transportation to Simonstown Naval dockyard and erection on the Orca rig of pipework ranged from Schedule 40 strong, 4" to 16" diameter. Installation of Mechanical items on riser platforms: hose reels, pumps, umbilicals. Testing & pre-commissioning.





Tonnage Analysis

- Total weight structural work: 25 tons
- Total weight piping work: 40 tons
- Total weight mechanical: 38 tons

MAINTENANCE KOEBERG NUCLEAR POWER STATION

Client: **ESKOM**

Location: Koeberg Nuclear Power Station - Cape Town, South

Date: 1991 to 2004

Manhours: 350 000 per annum

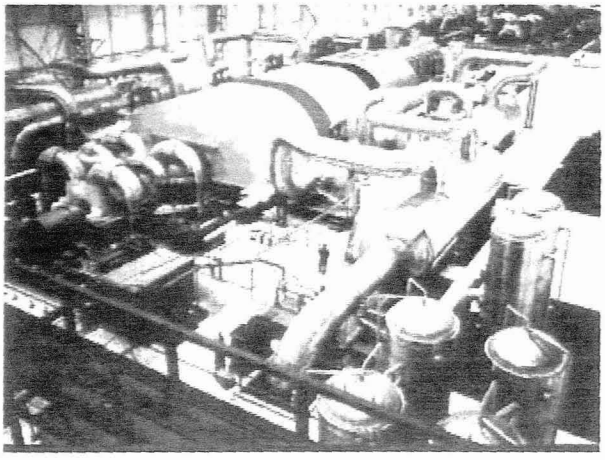
Contract Type: Rates

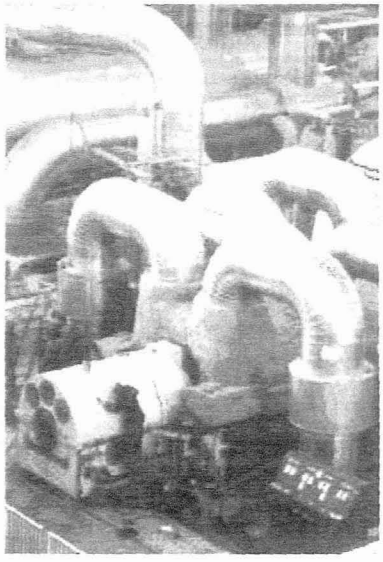
Project Scope

3 years contract for specialised welding services and associated labour supply for maintenance, repair, shutdown and plant extension.

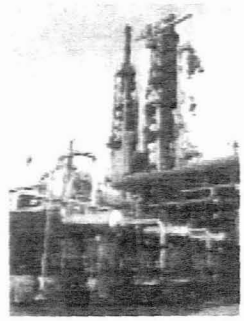
Approximately 350 000 man-hours are spent every year.

This contract is run by **RH Mechanicals**, a company of SA Five Group, with SA Five Engineering assistance and support for administration tendering, procurement and quality management.

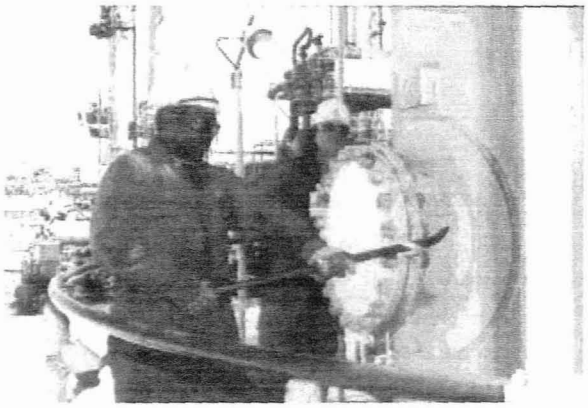




CALTEX REFINERY MAINTENANCE



Client:	**CALTEX**
Location:	Caltex Refinery - Cape Town, South Africa
Date:	1991-1994 and 1997 to 2004
Manhours:	250 000 man-hours per annum
Contract Type:	Rates



Project Scope

General maintenance and capital works covering management, supervision and supply of personnel for all disciplines (Excl. mechanic and instrumentation)

Approximately 250 000 man-hours are spent each year, plus shutdowns and plant extension/repairs.

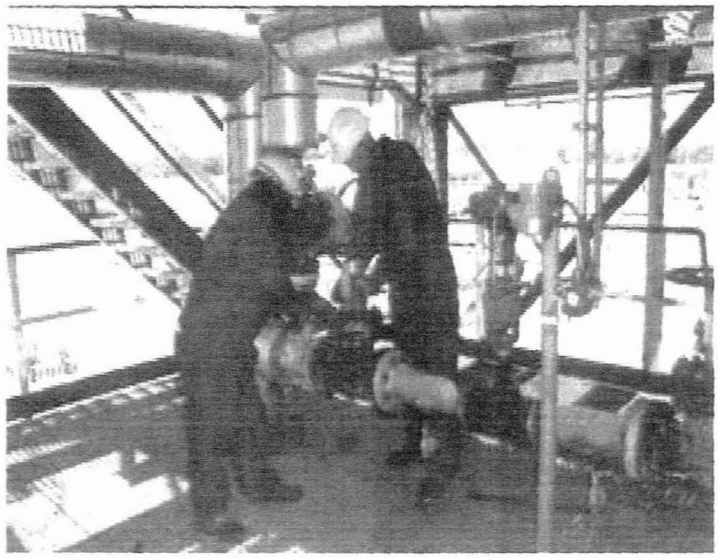
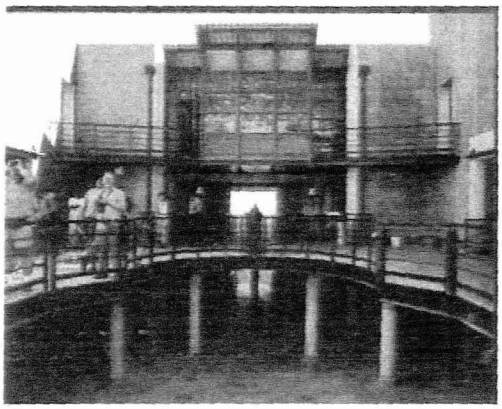
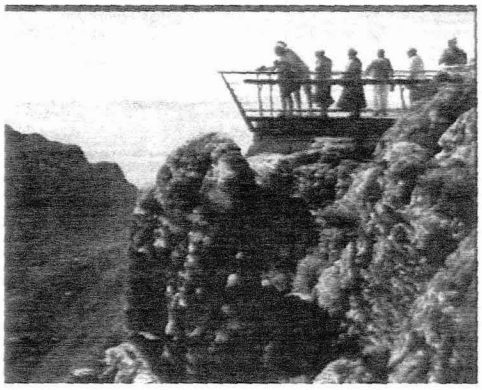
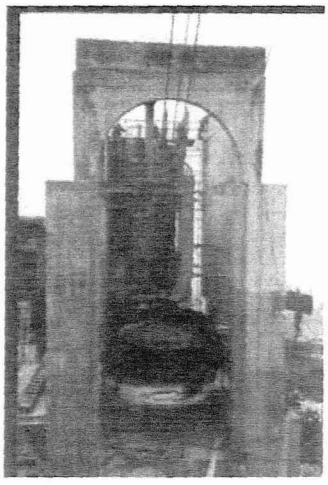


TABLE MOUNTAIN CABLEWAY

Client: **T.M.A.C**
Location: Table Mountain Cableway
Date: Completed December 1997
Contract Type: Lump Sum
Facility: **Blackheath**

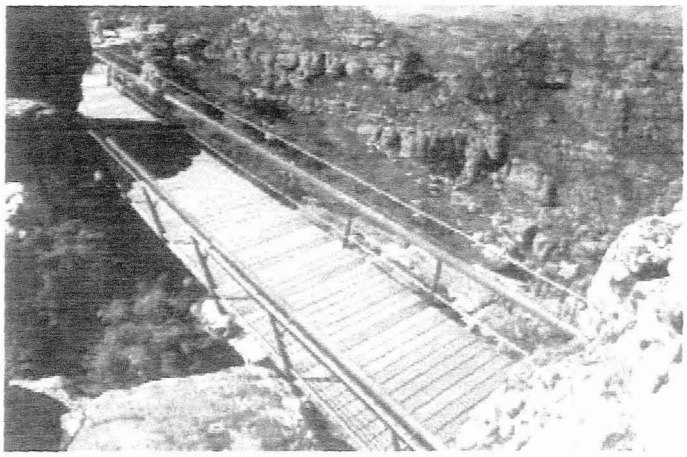


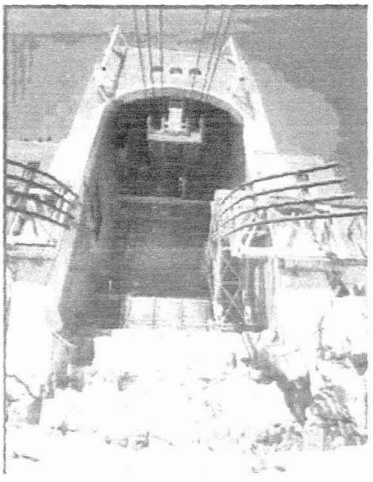




Project Scope
Procurement, fabrication and erection on site of architectural steelwork, main structural support structure, viewing platforms, upper and lower cable station.

Pre-fabrication at Blackheath Workshop of all structural steelwork, transportation to site and erection on Table Mountain of 3NB viewing platforms & 2NB bridges
Total Structural Weight 360 tons





CALEDON STEEP TANK PLANT

Client: **SA MALSTERS**

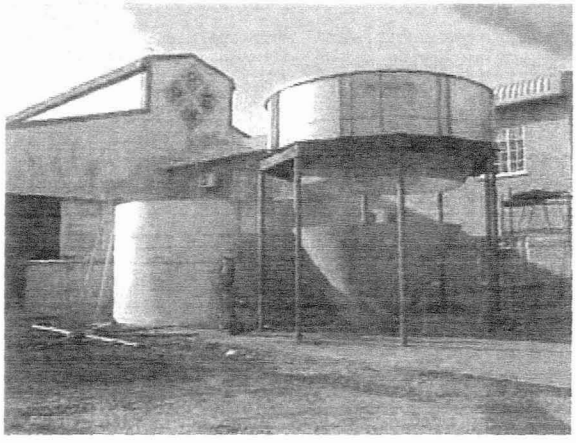
Location: Caledon - Western Cape - South Africa

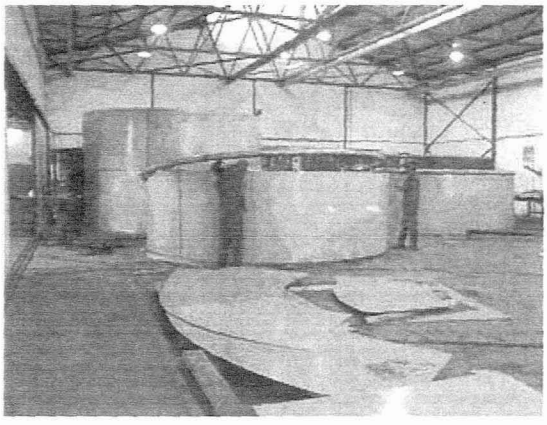
Date: August - November 1998

Facility: Blackheath

Project Scope

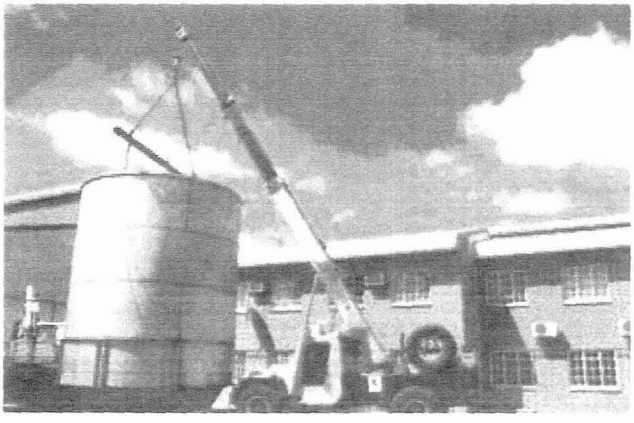
Procurement, fabrication and erection on site of architectural steelwork, main structural support structure, viewing platforms, upper and lower cable station. Procurement, fabrication and erection of steep tank and Kiln floors.





Fabrication at Blackheath workshop, transportation to site and installation of: Six tanks (5 m^2 diameter, 9.5 m high, 15 tons)

- 2 sets of 805 m^2 kiln floor
- Materials : 3 CR, Stainless Steel



Annexure B

Descriptive statistics for each variable

Position	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Director	2	5.88	2	5.88
Manager	11	32.35	13	38.24
Staff	21	61.76	34	100.00

Chi-Square Test for Equal Proportions

Chi-Square 15.9412
DF 2
Pr > ChiSq 0.0003
Sample Size = 34

Q01	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	3	9.09	3	9.09
Somewhat agree	5	15.15	8	24.24
Agree	14	42.42	22	66.67
Strongly agree	11	33.33	33	100.00

Chi-Square Test for Equal Proportions

Chi-Square 9.5455
DF 3
Pr > ChiSq 0.0229
Effective Sample Size = 33
Frequency Missing = 1

Q02	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Somewhat disagree	2	5.88	2	5.88
Somewhat agree	7	20.59	9	26.47
Agree	16	47.06	25	73.53
Strongly agree	9	26.47	34	100.00

Chi-Square Test for Equal Proportions

Chi-Square 11.8824
DF 3

Annexure B

Descriptive statistics for each variable

Position	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Director	2	5.88	2	5.88
Manager	11	32.35	13	38.24
Staff	21	61.76	34	100.00

Chi-Square Test for Equal Proportions

Chi-Square	15.9412
DF	2
Pr > ChiSq	0.0003

Sample Size = 34

Q01	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	3	9.09	3	9.09
Somewhat agree	5	15.15	8	24.24
Agree	14	42.42	22	66.67
Strongly agree	11	33.33	33	100.00

Chi-Square Test for Equal Proportions

Chi-Square	9.5455
DF	3
Pr > ChiSq	0.0229

Effective Sample Size = 33

Frequency Missing = 1

Q02	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Somewhat disagree	2	5.88	2	5.88
Somewhat agree	7	20.59	9	26.47
Agree	16	47.06	25	73.53
Strongly agree	9	26.47	34	100.00

Chi-Square Test for Equal Proportions

Chi-Square	11.8824
DF	3

Chi-Square 16.3529
DF 3
Pr > ChiSq 0.0010
Sample Size = 34

Q06	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly disagree	1	2.94	1	2.94
Somewhat disagree	1	2.94	2	5.88
Somewhat agree	5	14.71	7	20.59
Agree	19	55.88	26	76.47
Strongly agree	8	23.53	34	100.00

Chi-Square Test
for Equal Proportions
Chi-Square 32.4706
DF 4
Pr > ChiSq <.0001
Sample Size = 34

Q07	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly disagree	1	2.94	1	2.94
Disagree	2	5.88	3	8.82
Somewhat disagree	5	14.71	8	23.53
Somewhat agree	14	41.18	22	64.71
Agree	9	26.47	31	91.18
Strongly agree	3	8.82	34	100.00

Chi-Square Test
for Equal Proportions
Chi-Square 21.7647
DF 5
Pr > ChiSq 0.0006
Sample Size = 34

Q08	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly disagree	1	3.03	1	3.03
Somewhat disagree	3	9.09	4	12.12

Chi-Square 16.3529
DF 3
Pr > ChiSq 0.0010
Sample Size = 34

Q06	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly disagree	1	2.94	1	2.94
Somewhat disagree	1	2.94	2	5.88
Somewhat agree	5	14.71	7	20.59
Agree	19	55.88	26	76.47
Strongly agree	8	23.53	34	100.00

Chi-Square Test
for Equal Proportions
Chi-Square 32.4706
DF 4
Pr > ChiSq <.0001
Sample Size = 34

Q07	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly disagree	1	2.94	1	2.94
Disagree	2	5.88	3	8.82
Somewhat disagree	5	14.71	8	23.53
Somewhat agree	14	41.18	22	64.71
Agree	9	26.47	31	91.18
Strongly agree	3	8.82	34	100.00

Chi-Square Test
for Equal Proportions
Chi-Square 21.7647
DF 5
Pr > ChiSq 0.0006
Sample Size = 34

Q08	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly disagree	1	3.03	1	3.03
Somewhat disagree	3	9.09	4	12.12

Somewhat agree	10	30.30	14	42.42
Agree	13	39.39	27	81.82
Strongly agree	6	18.18	33	100.00

Chi-Square Test
for Equal Proportions
ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ
Chi-Square 14.7273
DF 4
Pr > ChiSq 0.0053
Effective Sample Size = 33
Frequency Missing = 1

Q09	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	1	2.94	1	2.94
Somewhat disagree	5	14.71	6	17.65
Somewhat agree	4	11.76	10	29.41
Agree	14	41.18	24	70.59
Strongly agree	10	29.41	34	100.00

Chi-Square Test
for Equal Proportions
ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ
Chi-Square 15.7059
DF 4
Pr > ChiSq 0.0034
Sample Size = 34

q10n	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	8	24.24	8	24.24
Somewhat disagree	9	27.27	17	51.52
Somewhat agree	3	9.09	20	60.61
Agree	5	15.15	25	75.76
Strongly agree	8	24.24	33	100.00

Chi-Square Test
for Equal Proportions
ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ
Chi-Square 3.8182
DF 4
Pr > ChiSq 0.4312
Effective Sample Size = 33
Frequency Missing = 1

Q11	Frequency	Percent	Cumulative Frequency	Cumulative Percent

ƒƒƒ

	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	1	3.03	1	3.03
Somewhat disagree	1	3.03	2	6.06
Somewhat agree	13	39.39	15	45.45
Agree	14	42.42	29	87.88
Strongly agree	4	12.12	33	100.00

Chi-Square Test
for Equal Proportions
ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ
Chi-Square 25.0303
DF 4
Pr > ChiSq <.0001
Effective Sample Size = 33
Frequency Missing = 1

Q12	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly disagree	3	8.82	3	8.82
Disagree	5	14.71	8	23.53
Somewhat disagree	7	20.59	15	44.12
Somewhat agree	12	35.29	27	79.41
Agree	4	11.76	31	91.18
Strongly agree	3	8.82	34	100.00

Chi-Square Test
for Equal Proportions
ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ
Chi-Square 10.4706
DF 5
Pr > ChiSq 0.0629
Sample Size = 34

q13n	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	7	21.21	7	21.21
Somewhat disagree	16	48.48	23	69.70
Somewhat agree	5	15.15	28	84.85
Agree	3	9.09	31	93.94
Strongly agree	2	6.06	33	100.00

Chi-Square Test
for Equal Proportions
ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ
Chi-Square 18.9697
DF 4

Pr > ChiSq 0.0008
Effective Sample Size = 33
Frequency Missing = 1

Q14	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly disagree	1	3.03	1	3.03
Disagree	6	18.18	7	21.21
Somewhat disagree	6	18.18	13	39.39
Somewhat agree	14	42.42	27	81.82
Agree	6	18.18	33	100.00

Chi-Square Test
for Equal Proportions
Chi-Square 13.2121
DF 4
Pr > ChiSq 0.0103
Effective Sample Size = 33
Frequency Missing = 1

Q15	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Somewhat disagree	5	14.71	5	14.71
Somewhat agree	7	20.59	12	35.29
Agree	14	41.18	26	76.47
Strongly agree	8	23.53	34	100.00

Chi-Square Test
for Equal Proportions
Chi-Square 5.2941
DF 3
Pr > ChiSq 0.1515
Sample Size = 34

Q16	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly disagree	2	5.88	2	5.88
Disagree	3	8.82	5	14.71
Somewhat disagree	7	20.59	12	35.29
Somewhat agree	9	26.47	21	61.76
Agree	8	23.53	29	85.29
Strongly agree	5	14.71	34	100.00

Chi-Square Test
for Equal Proportions
ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ
Chi-Square 6.9412
DF 5
Pr > ChiSq 0.2251
Sample Size = 34

Q17	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly disagree	1	2.94	1	2.94
Disagree	1	2.94	2	5.88
Somewhat disagree	4	11.76	6	17.65
Somewhat agree	16	47.06	22	64.71
Agree	11	32.35	33	97.06
Strongly agree	1	2.94	34	100.00

Chi-Square Test
for Equal Proportions
ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ
Chi-Square 35.8824
DF 5
Pr > ChiSq <.0001
Sample Size = 34

Q18	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Somewhat disagree	1	2.94	1	2.94
Somewhat agree	7	20.59	8	23.53
Agree	22	64.71	30	88.24
Strongly agree	4	11.76	34	100.00

Chi-Square Test
for Equal Proportions
ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ
Chi-Square 30.7059
DF 3
Pr > ChiSq <.0001
Sample Size = 34

Q19

Q19	Frequency	Percent	Cumulative Frequency	Cumulative Percent

		Percent		
Somewhat disagree	5	14.71	5	14.71
Somewhat agree	12	35.29	17	50.00
Agree	10	29.41	27	79.41
Strongly agree	7	20.59	34	100.00

Chi-Square Test for Equal Proportions

Chi-Square	3.4118
DF	3
Pr > ChiSq	0.3324

Sample Size = 34

q20n	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly disagree	1	2.94	1	2.94
Disagree	5	14.71	6	17.65
Somewhat disagree	10	29.41	16	47.06
Somewhat agree	9	26.47	25	73.53
Agree	7	20.59	32	94.12
Strongly agree	2	5.88	34	100.00

Chi-Square Test for Equal Proportions

Chi-Square	11.8824
DF	5
Pr > ChiSq	0.0364

Sample Size = 34

Q21	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	1	3.03	1	3.03
Somewhat disagree	10	30.30	11	33.33
Somewhat agree	15	45.45	26	78.79
Agree	7	21.21	33	100.00

Chi-Square Test for Equal Proportions

Chi-Square	12.4545
DF	3
Pr > ChiSq	0.0060

Effective Sample Size = 33
Frequency Missing = 1

Q22	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly disagree	1	3.03	1	3.03
Disagree	2	6.06	3	9.09
Somewhat disagree	5	15.15	8	24.24
Somewhat agree	11	33.33	19	57.58
Agree	10	30.30	29	87.88
Strongly agree	4	12.12	33	100.00

Chi-Square Test for Equal Proportions

Chi-Square	15.5455
DF	5
Pr > ChiSq	0.0083

Effective Sample Size = 33
Frequency Missing = 1

Q23	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly disagree	1	2.94	1	2.94
Disagree	5	14.71	6	17.65
Somewhat disagree	5	14.71	11	32.35
Somewhat agree	6	17.65	17	50.00
Agree	10	29.41	27	79.41
Strongly agree	7	20.59	34	100.00

Chi-Square Test for Equal Proportions

Chi-Square	7.6471
DF	5
Pr > ChiSq	0.1768

Sample Size = 34

Q24	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly disagree	2	5.88	2	5.88
Disagree	1	2.94	3	8.82
Somewhat disagree	3	8.82	6	17.65
Somewhat agree	11	32.35	17	50.00
Agree	10	29.41	27	79.41

Strongly agree	7	20.59	34	100.00

Chi-Square Test
for Equal Proportions
ffffffffffffffffffff
Chi-Square 16.1176
DF 5
Pr > ChiSq 0.0065
Sample Size = 34

Q01	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	3	9.09	3	9.09
Agree	30	90.91	33	100.00

Chi-Square Test
for Equal Proportions
ffffffffffffffffffff
Chi-Square 22.0909
DF 1
Pr > ChiSq <.0001
Effective Sample Size = 33
Frequency Missing = 1

Q02	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	2	5.88	2	5.88
Agree	32	94.12	34	100.00

Chi-Square Test
for Equal Proportions
ffffffffffffffffffff
Chi-Square 26.4706
DF 1
Pr > ChiSq <.0001
Sample Size = 34

Q03	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	2	5.88	2	5.88
Agree	32	94.12	34	100.00

Chi-Square Test
for Equal Proportions
ffffffffffffffffffff
Chi-Square 26.4706
DF 1

Pr > ChiSq <.0001
Sample Size = 34

Q04	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	1	2.94	1	2.94
Agree	33	97.06	34	100.00

Chi-Square Test
for Equal Proportions

Chi-Square 30.1176
DF 1
Pr > ChiSq <.0001
Sample Size = 34

Q05	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	2	5.88	2	5.88
Agree	32	94.12	34	100.00

Chi-Square Test
for Equal Proportions

Chi-Square 26.4706
DF 1
Pr > ChiSq <.0001
Sample Size = 34

Q06	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	2	5.88	2	5.88
Agree	32	94.12	34	100.00

Chi-Square Test
for Equal Proportions

Chi-Square 26.4706
DF 1
Pr > ChiSq <.0001
Sample Size = 34

Q07	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	8	23.53	8	23.53
Agree	26	76.47	34	100.00

Chi-Square Test
for Equal Proportions

ffffffffffffffffffff

Chi-Square	9.5294
DF	1
Pr > ChiSq	0.0020

Sample Size = 34

Q08	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	4	12.12	4	12.12
Agree	29	87.88	33	100.00

Chi-Square Test for Equal Proportions

ffffffffffffffffffff

Chi-Square	18.9394
DF	1
Pr > ChiSq	<.0001

Effective Sample Size = 33

Frequency Missing = 1

Q09	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	6	17.65	6	17.65
Agree	28	82.35	34	100.00

Chi-Square Test for Equal Proportions

ffffffffffffffffffff

Chi-Square	14.2353
DF	1
Pr > ChiSq	0.0002

Sample Size = 34

q10n	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	17	51.52	17	51.52
Agree	16	48.48	33	100.00

Chi-Square Test for Equal Proportions

ffffffffffffffffffff

Chi-Square	0.0303
DF	1
Pr > ChiSq	0.8618

Effective Sample Size = 33

Frequency Missing = 1

Q11	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	2	6.06	2	6.06
Agree	31	93.94	33	100.00

Chi-Square Test for Equal Proportions

Chi-Square	25.4848
DF	1
Pr > ChiSq	<.0001

Effective Sample Size = 33
Frequency Missing = 1

Q12	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	15	44.12	15	44.12
Agree	19	55.88	34	100.00

Chi-Square Test for Equal Proportions

Chi-Square	0.4706
DF	1
Pr > ChiSq	0.4927

Sample Size = 34

q13n	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	23	69.70	23	69.70
Agree	10	30.30	33	100.00

Chi-Square Test for Equal Proportions

Chi-Square	5.1212
DF	1
Pr > ChiSq	0.0236

Effective Sample Size = 33
Frequency Missing = 1

Q14	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	13	39.39	13	39.39
Agree	20	60.61	33	100.00

Chi-Square Test

for Equal Proportions
ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ
Chi-Square 1.4848
DF 1
Pr > ChiSq 0.2230
Effective Sample Size = 33
Frequency Missing = 1

Q15	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	5	14.71	5	14.71
Agree	29	85.29	34	100.00

Chi-Square Test
for Equal Proportions
ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ
Chi-Square 16.9412
DF 1
Pr > ChiSq <.0001
Sample Size = 34

Q16	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	12	35.29	12	35.29
Agree	22	64.71	34	100.00

Chi-Square Test
for Equal Proportions
ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ
Chi-Square 2.9412
DF 1
Pr > ChiSq 0.0863
Sample Size = 34

Q17	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	6	17.65	6	17.65
Agree	28	82.35	34	100.00

Chi-Square Test
for Equal Proportions
ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ
Chi-Square 14.2353
DF 1
Pr > ChiSq 0.0002
Sample Size = 34

Q18	Frequency	Percent	Cumulative Frequency	Cumulative Percent

ƒƒ

Disagree	1	2.94	1	2.94
Agree	33	97.06	34	100.00

Chi-Square Test
for Equal Proportions
ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ
Chi-Square 30.1176
DF 1
Pr > ChiSq <.0001
Sample Size = 34

Q19	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	5	14.71	5	14.71
Agree	29	85.29	34	100.00

Chi-Square Test
for Equal Proportions
ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ
Chi-Square 16.9412
DF 1
Pr > ChiSq <.0001
Sample Size = 34

q20n	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	16	47.06	16	47.06
Agree	18	52.94	34	100.00

Chi-Square Test
for Equal Proportions
ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ
Chi-Square 0.1176
DF 1
Pr > ChiSq 0.7316
Sample Size = 34

Q21	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	11	33.33	11	33.33
Agree	22	66.67	33	100.00

Chi-Square Test
for Equal Proportions
ƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒƒ
Chi-Square 3.6667
DF 1
Pr > ChiSq 0.0555

Effective Sample Size = 33
Frequency Missing = 1

Q22	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	8	24.24	8	24.24
Agree	25	75.76	33	100.00

Chi-Square Test for Equal Proportions

Chi-Square	8.7576
DF	1
Pr > ChiSq	0.0031

Effective Sample Size = 33
Frequency Missing = 1

Q23	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	11	32.35	11	32.35
Agree	23	67.65	34	100.00

Chi-Square Test for Equal Proportions

Chi-Square	4.2353
DF	1
Pr > ChiSq	0.0396

Sample Size = 34

Q24	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	6	17.65	6	17.65
Agree	28	82.35	34	100.00

Chi-Square Test for Equal Proportions

Chi-Square	14.2353
DF	1
Pr > ChiSq	0.0002

Sample Size = 34

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum	Label
Q01	28	5.07143	0.94000	142.00000	2.00000	6.00000	Q01
Q02	28	4.96429	0.79266	139.00000	3.00000	6.00000	Q02
Q03	28	5.07143	1.15241	142.00000	1.00000	6.00000	Q03
Q04	28	5.07143	1.08623	142.00000	1.00000	6.00000	Q04
Q05	28	5.00000	0.86066	140.00000	3.00000	6.00000	Q05
Q06	28	4.82143	1.02030	135.00000	1.00000	6.00000	Q06
Q07	28	4.14286	1.00791	116.00000	2.00000	6.00000	Q07
Q08	28	4.57143	1.10315	128.00000	1.00000	6.00000	Q08
Q09	28	4.78571	1.06657	134.00000	3.00000	6.00000	Q09
q10n	28	3.85714	1.60357	108.00000	2.00000	6.00000	
Q11	28	4.53571	0.69293	127.00000	3.00000	6.00000	Q11
Q12	28	3.50000	1.45297	98.00000	1.00000	6.00000	Q12
q13n	28	3.28571	1.15011	92.00000	2.00000	6.00000	
Q14	28	3.64286	1.09593	102.00000	1.00000	5.00000	Q14
Q15	28	4.67857	1.09048	131.00000	3.00000	6.00000	Q15
Q16	28	4.03571	1.37389	113.00000	1.00000	6.00000	Q16
Q17	28	4.07143	1.05158	114.00000	1.00000	6.00000	Q17
Q18	28	4.82143	0.66964	135.00000	3.00000	6.00000	Q18
Q19	28	4.64286	1.02611	130.00000	3.00000	6.00000	Q19
q20n	28	3.78571	1.16610	106.00000	2.00000	6.00000	
Q21	28	3.85714	0.80343	108.00000	2.00000	5.00000	Q21
Q22	28	4.10714	1.16553	115.00000	1.00000	6.00000	Q22
Q23	28	4.10714	1.54774	115.00000	1.00000	6.00000	Q23
Q24	28	4.46429	1.29048	125.00000	1.00000	6.00000	Q24

Cronbach Coefficient Alpha

Variables	Alpha
Raw	0.820634
Standardized	0.827131

Cronbach Coefficient Alpha with Deleted Variable

	Raw Variables		Standardized Variables		
Deleted Variable	Correlation with Total	Alpha	Correlation with Total	Alpha	Label
Q01	0.422223	0.812239	0.411397	0.819195	Q01
Q02	0.216313	0.819422	0.260831	0.825464	Q02
Q03	0.181353	0.822270	0.214278	0.827367	Q03
Q04	0.073797	0.826200	0.114552	0.831390	Q04
Q05	0.382010	0.814024	0.401532	0.819611	Q05
Q06	0.428869	0.811625	0.457198	0.817254	Q06
Q07	0.386128	0.813375	0.382382	0.820417	

Cronbach Coefficient Alpha with Deleted Variable

	Raw Variables		Standardized Variables		
Deleted Variable	Correlation with Total	Alpha	Correlation with Total	Alpha	Label
Q07					
Q08	0.307190	0.816602	0.319705	0.823033	Q08
Q09	0.704685	0.799503	0.711176	0.806190	Q09
q10n	0.055806	0.834341	0.079329	0.832793	
Q11	0.573263	0.809695	0.585626	0.811723	Q11
Q12	0.460162	0.809378	0.451692	0.817488	Q12
q13n	0.255227	0.819014	0.231040	0.826684	
Q14	0.217823	0.820357	0.219566	0.827152	Q14
Q15	0.641374	0.802006	0.612700	0.810540	Q15
Q16	0.639760	0.799261	0.610536	0.810635	Q16
Q17	0.217166	0.820165	0.230865	0.826691	Q17
Q18	0.062688	0.823252	0.064489		

0.833381	Q18			
	Q19	0.690108	0.800746	0.644049
0.809164	Q19			
	q20n	0.177251	0.822553	0.145156
0.830163				
	Q21	0.417920	0.813158	0.429556
0.818428	Q21			
	Q22	0.270340	0.818408	0.280549
0.824653	Q22			
	Q23	0.558445	0.803360	0.533351
0.813990	Q23			
	Q24	0.577531	0.803287	0.553708
0.813110	Q24			

Annexure C

The NPAR1WAY Procedure
Analysis of Variance for Variable Q01
Classified by Variable Position

Position	N	Mean
Management	13	5.076923
Staff	21	4.571429

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	1	2.051713	2.051713	1.0248	0.3190
Within	32	64.065934	2.002060		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable Q01
Classified by Variable Position

Position	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Management	13	275.0	227.50	26.668544	21.153846
Staff	21	320.0	367.50	26.668544	15.238095

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	275.0000
Normal Approximation	
Z	1.7624
One-Sided Pr > Z	0.0390
Two-Sided Pr > |Z|	0.0780
t Approximation	
One-Sided Pr > Z	0.0436
Two-Sided Pr > |Z|	0.0873

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	3.1724
DF	1
Pr > Chi-Square	0.0749

Analysis of Variance for Variable Q02
Classified by Variable Position

Position	N	Mean
Management	13	4.846154
Staff	21	5.000000

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	1	0.190045	0.190045	0.2567	0.6159
Within	32	23.692308	0.740385		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable Q02
Classified by Variable Position

Position	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Management	13	214.50	227.50	26.305690	16.500000
Staff	21	380.50	367.50	26.305690	18.119048

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	214.5000
Normal Approximation	
Z	-0.4752
One-Sided Pr < Z	0.3173
Two-Sided Pr > |Z|	0.6347
t Approximation	
One-Sided Pr < Z	0.3189
Two-Sided Pr > |Z|	0.6378

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.2442
DF	1
Pr > Chi-Square	0.6212

Analysis of Variance for Variable Q03
Classified by Variable Position

Position	N	Mean
Management	13	5.230769
Staff	21	4.857143

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	1	1.120879	1.120879	0.9226	0.3440
Within	32	38.879121	1.214973		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable Q03
Classified by Variable Position

Position	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Management	13	245.0	227.50	26.652573	18.846154
Staff	21	350.0	367.50	26.652573	16.666667

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	245.0000
Normal Approximation	
Z	0.6378
One-Sided Pr > Z	0.2618
Two-Sided Pr > |Z|	0.5236
t Approximation	
One-Sided Pr > Z	0.2640
Two-Sided Pr > |Z|	0.5280

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.4311
DF	1
Pr > Chi-Square	0.5114

Analysis of Variance for Variable Q04
Classified by Variable Position

Position	N	Mean
Management	13	5.230769
Staff	21	5.000000

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	1	0.427602	0.427602	0.4235	0.5198
Within	32	32.307692	1.009615		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable Q04
Classified by Variable Position

Position	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Management	13	234.0	227.50	26.005681	18.000000
Staff	21	361.0	367.50	26.005681	17.190476

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	234.0000
Normal Approximation	
Z	0.2307
One-Sided Pr > Z	0.4088
Two-Sided Pr > |Z|	0.8175
t Approximation	
One-Sided Pr > Z	0.4095
Two-Sided Pr > |Z|	0.8190

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.0625
DF	1
Pr > Chi-Square	0.8026

Analysis of Variance for Variable Q05
Classified by Variable Position

Position	N	Mean
Management	13	4.923077
Staff	21	4.952381

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	1	0.006895	0.006895	0.0101	0.920
Within	32	21.875458	0.683608		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable Q05
Classified by Variable Position

Position	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Management	13	226.50	227.50	25.763631	17.423077
Staff	21	368.50	367.50	25.763631	17.547619

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	226.5000
Normal Approximation	
Z	-0.0194
One-Sided Pr < Z	0.4923
Two-Sided Pr > |Z|	0.9845
t Approximation	
One-Sided Pr < Z	0.4923
Two-Sided Pr > |Z|	0.9846

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.0015
DF	1
Pr > Chi-Square	0.9690

Analysis of Variance for Variable Q06
Classified by Variable Position

Position	N	Mean
Management	13	5.076923
Staff	21	4.809524

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	1	0.574122	0.574122	0.5712	0.4553
Within	32	32.161172	1.005037		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable Q06
Classified by Variable Position

Position	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Management	13	237.50	227.50	25.395034	18.269231
Staff	21	357.50	367.50	25.395034	17.023810

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	237.5000
Normal Approximation	
Z	0.3741
One-Sided Pr > Z	0.3542
Two-Sided Pr > |Z|	0.7083
t Approximation	
One-Sided Pr > Z	0.3554
Two-Sided Pr > |Z|	0.7107

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.1551
DF	1
Pr > Chi-Square	0.6937

Analysis of Variance for Variable Q07
Classified by Variable Position

Position	N	Mean
Management	13	4.384615
Staff	21	3.904762

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	1	1.848847	1.848847	1.4470	0.2378
Within	32	40.886447	1.277701		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable Q07
Classified by Variable Position

Position	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Management	13	252.0	227.50	26.893407	19.384615
Staff	21	343.0	367.50	26.893407	16.333333

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	252.0000
Normal Approximation	
Z	0.8924
One-Sided Pr > Z	0.1861
Two-Sided Pr > |Z|	0.3722
t Approximation	
One-Sided Pr > Z	0.1893
Two-Sided Pr > |Z|	0.3786

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.8299
DF	1
Pr > Chi-Square	0.3623

Analysis of Variance for Variable Q08
Classified by Variable Position

Position	N	Mean
Management	13	4.384615
Staff	21	4.476190

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	1	0.067335	0.067335	0.0369	0.8488
Within	32	58.315018	1.822344		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable Q08
Classified by Variable Position

Position	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Management	13	237.50	227.50	26.965689	18.269231
Staff	21	357.50	367.50	26.965689	17.023810

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	237.5000
Normal Approximation	
Z	0.3523
One-Sided Pr > Z	0.3623
Two-Sided Pr > |Z|	0.7246
t Approximation	
One-Sided Pr > Z	0.3634
Two-Sided Pr > |Z|	0.7269

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.1375
DF	1
Pr > Chi-Square	0.7108

Analysis of Variance for Variable Q09
Classified by Variable Position

Position	N	Mean
Management	13	5.000000
Staff	21	4.666667

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	1	0.892157	0.892157	0.7020	0.4083
Within	32	40.666667	1.270833		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable Q09
Classified by Variable Position

Position	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Management	13	251.50	227.50	26.780076	19.346154
Staff	21	343.50	367.50	26.780076	16.357143

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	251.5000
Normal Approximation	
Z	0.8775
One-Sided Pr > Z	0.1901
Two-Sided Pr > |Z|	0.3802
t Approximation	
One-Sided Pr > Z	0.1933
Two-Sided Pr > |Z|	0.3865

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.8032
DF	1
Pr > Chi-Square	0.3702

Analysis of Variance for Variable Q10
Classified by Variable Position

Position	N	Mean
Management	13	2.923077
Staff	21	3.095238

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	1	0.237988	0.237988	0.0878	0.7689
Within	32	86.732601	2.710394		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable Q10

Classified by Variable Position

Position	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Management	13	220.0	227.50	27.537116	16.923077
Staff	21	375.0	367.50	27.537116	17.857143

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	220.0000
Normal Approximation	
Z	-0.2542
One-Sided Pr < Z	0.3997
Two-Sided Pr > |Z|	0.7993
t Approximation	
One-Sided Pr < Z	0.4005
Two-Sided Pr > |Z|	0.8009

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.0742
DF	1
Pr > Chi-Square	0.7853

Analysis of Variance for Variable Q11
Classified by Variable Position

Position	N	Mean
Management	13	4.307692
Staff	21	4.523810

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	1	0.375027	0.375027	0.2727	0.6051
Within	32	44.007326	1.375229		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable Q11
Classified by Variable Position

Position	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Management	13	226.50	227.50	26.370357	

17.423077
Staff 21 368.50 367.50 26.370357
17.547619

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	226.5000
Normal Approximation	
Z	-0.0190
One-Sided Pr < Z	0.4924
Two-Sided Pr > |Z|	0.9849
t Approximation	
One-Sided Pr < Z	0.4925
Two-Sided Pr > |Z|	0.9850

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.0014
DF	1
Pr > Chi-Square	0.9698

Analysis of Variance for Variable Q12
Classified by Variable Position

Position	N	Mean
Management	13	3.230769
Staff	21	3.714286

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	1	1.877182	1.877182	0.9914	0.3269
Within	32	60.593407	1.893544		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable Q12
Classified by Variable Position

Position	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Management	13	198.50	227.50	27.386494	15.269231
Staff	21	396.50	367.50	27.386494	18.880952

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	198.5000
Normal Approximation	
Z	-1.0407
One-Sided Pr < Z	0.1490
Two-Sided Pr > |Z|	0.2980

t Approximation
One-Sided Pr < Z 0.1528
Two-Sided Pr > |Z| 0.3056
Z includes a continuity correction of 0.5.

Kruskal-Wallis Test
Chi-Square 1.1213
DF 1
Pr > Chi-Square 0.2896

Analysis of Variance for Variable Q13
Classified by Variable Position

Position	N	Mean
Management	13	3.769231
Staff	21	3.476190

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	1	0.689507	0.689507	0.4281	0.5176
Within	32	51.545788	1.610806		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable Q13
Classified by Variable Position

Position	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Management	13	239.0	227.50	26.526750	18.384615
Staff	21	356.0	367.50	26.526750	16.952381

Average scores were used for ties.

Wilcoxon Two-Sample Test
Statistic 239.0000
Normal Approximation
Z 0.4147
One-Sided Pr > Z 0.3392
Two-Sided Pr > |Z| 0.6784
t Approximation
One-Sided Pr > Z 0.3405
Two-Sided Pr > |Z| 0.6811
Z includes a continuity correction of 0.5.

Kruskal-Wallis Test
Chi-Square 0.1879
DF 1

Pr > Chi-Square 0.6646

Analysis of Variance for Variable Q14
Classified by Variable Position

Position	N	Mean
Management	13	3.461538
Staff	21	3.428571

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	1	0.008727	0.008727	0.0055	0.9411
Within	32	50.373626	1.574176		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable Q14
Classified by Variable Position

Position	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Management	13	221.50	227.50	26.983730	17.038462
Staff	21	373.50	367.50	26.983730	17.785714

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	221.5000
Normal Approximation	
Z	-0.2038
One-Sided Pr < Z	0.4192
Two-Sided Pr > |Z|	0.8385
t Approximation	
One-Sided Pr < Z	0.4199
Two-Sided Pr > |Z|	0.8397

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.0494
DF	1
Pr > Chi-Square	0.8240

Analysis of Variance for Variable Q15
Classified by Variable Position

Position	N	Mean
Management	13	4.923077
Staff	21	4.619048

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	1	0.742189	0.742189	0.7451	0.3945
Within	32	31.875458	0.996108		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable Q15
Classified by Variable Position

Position	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Management	13	254.0	227.50	26.859458	19.538462
Staff	21	341.0	367.50	26.859458	16.238095

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	254.0000
Normal Approximation	
Z	0.9680
One-Sided Pr > Z	0.1665
Two-Sided Pr > |Z|	0.3330
t Approximation	
One-Sided Pr > Z	0.1700
Two-Sided Pr > |Z|	0.3401

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.9734
DF	1
Pr > Chi-Square	0.3238

Analysis of Variance for Variable Q16
Classified by Variable Position

Position	N	Mean
Management	13	4.076923
Staff	21	3.904762

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	1	0.237988	0.237988	0.1176	0.7338
Within	32	64.732601	2.022894		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable Q16
Classified by Variable Position

Position	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Management	13	233.0	227.50	27.596694	17.923077
Staff	21	362.0	367.50	27.596694	17.238095

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	233.0000
Normal Approximation	
Z	0.1812
One-Sided Pr > Z	0.4281
Two-Sided Pr > |Z|	0.8562
t Approximation	
One-Sided Pr > Z	0.4287
Two-Sided Pr > |Z|	0.8573

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.0397
DF	1
Pr > Chi-Square	0.8420

Analysis of Variance for Variable Q17
Classified by Variable Position

Position	N	Mean
Management	13	3.615385
Staff	21	4.428571

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	1	5.309632	5.309632	6.4802	0.0159
Within	32	26.219780	0.819368		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable Q17
Classified by Variable Position

Position	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Management	13	173.0	227.50	26.182846	13.307692
Staff	21	422.0	367.50	26.182846	20.09523

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	173.0000
Normal Approximation	
Z	-2.0624
One-Sided Pr < Z	0.0196
Two-Sided Pr > |Z|	0.0392
t Approximation	
One-Sided Pr < Z	0.0236
Two-Sided Pr > |Z|	0.0471

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	4.3327
DF	1
Pr > Chi-Square	0.0374

Analysis of Variance for Variable Q18
Classified by Variable Position

Position	N	Mean
Management	13	4.615385
Staff	21	5.000000

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	1	1.187783	1.187783	2.9066	0.0979
Within	32	13.076923	0.408654		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable Q18
Classified by Variable Position

Position	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score

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Management	13	191.50	227.50	23.932503
14.730769				
Staff	21	403.50	367.50	23.932503
19.214286				

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	191.5000
Normal Approximation	
Z	-1.4833
One-Sided Pr < Z	0.0690
Two-Sided Pr > |Z|	0.1380
t Approximation	
One-Sided Pr < Z	0.0737
Two-Sided Pr > |Z|	0.1475

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	2.2627
DF	1
Pr > Chi-Square	0.1325

Analysis of Variance for Variable Q19
Classified by Variable Position

Position	N	Mean
ffffffffffffffffffffffffffffffffffff		
Management	13	4.538462
Staff	21	4.571429

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
ffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffff					
Among	1	0.008727	0.008727	0.0086	0.9266
Within	32	32.373626	1.011676		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable Q19
Classified by Variable Position

Position	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
fffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffffff					
Management	13	221.50	227.50	27.058018	17.038462
Staff	21	373.50	367.50	27.058018	17.785714

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	221.5000

Normal Approximation
Z -0.2033
One-Sided Pr < Z 0.4195
Two-Sided Pr > |Z| 0.8389
t Approximation
One-Sided Pr < Z 0.4201
Two-Sided Pr > |Z| 0.8402
Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.0492
DF	1
Pr > Chi-Square	0.8245

Analysis of Variance for Variable Q20
Classified by Variable Position

Position	N	Mean
Management	13	2.923077
Staff	21	3.619048

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	1	3.889248	3.889248	2.7129	0.1093
Within	32	45.875458	1.433608		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable Q20
Classified by Variable Position

Position	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Management	13	183.50	227.50	27.426445	14.115385
Staff	21	411.50	367.50	27.426445	19.595238

Average scores were used for ties.

Wilcoxon Two-Sample Test
Statistic 183.5000
Normal Approximation
Z -1.5861
One-Sided Pr < Z 0.0564
Two-Sided Pr > |Z| 0.1127
t Approximation
One-Sided Pr < Z 0.0611
Two-Sided Pr > |Z| 0.1223
Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square 2.5737
DF 1
Pr > Chi-Square 0.1086

Analysis of Variance for Variable Q21
Classified by Variable Position

Position	N	Mean
Management	13	3.615385
Staff	21	3.809524

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	1	0.302629	0.302629	0.2822	0.5989
Within	32	34.315018	1.072344		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable Q21
Classified by Variable Position

Position	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Management	13	201.50	227.50	26.480848	15.500000
Staff	21	393.50	367.50	26.480848	18.738095

Average scores were used for ties.

Wilcoxon Two-Sample Test
Statistic 201.5000
Normal Approximation
Z -0.9630
One-Sided Pr < Z 0.1678
Two-Sided Pr > |Z| 0.3356
t Approximation
One-Sided Pr < Z 0.1713
Two-Sided Pr > |Z| 0.3426
Z includes a continuity correction of 0.5.

Kruskal-Wallis Test
Chi-Square 0.9640
DF 1
Pr > Chi-Square 0.3262

Analysis of Variance for Variable Q22
Classified by Variable Position

Position	N	Mean
Management	13	4.230769

Staff 21 3.952381

Source DF Sum of Squares Mean Square F Value Pr > F

Among 1 0.622280 0.622280 0.3148 0.5787

Within 32 63.260073 1.976877

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable Q22
Classified by Variable Position

Position	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Management	13	234.0	227.50	27.306416	18.000000
Staff	21	361.0	367.50	27.306416	17.190476

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	234.0000
Normal Approximation	
Z	0.2197
One-Sided Pr > Z	0.4130
Two-Sided Pr > |Z|	0.8261
t Approximation	
One-Sided Pr > Z	0.4137
Two-Sided Pr > |Z|	0.8274

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.0567
DF	1
Pr > Chi-Square	0.8119

Analysis of Variance for Variable Q23
Classified by Variable Position

Position	N	Mean
Management	13	3.923077
Staff	21	4.333333

Source DF Sum of Squares Mean Square F Value Pr > F

Among 1 1.351433 1.351433 0.6214

0.4363

Within	32	69.589744	2.174679	

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable Q23
Classified by Variable Position

Position	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Management	13	208.50	227.50	27.572437	16.038462
Staff	21	386.50	367.50	27.572437	18.404762

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	208.5000
Normal Approximation	
Z	-0.6710
One-Sided Pr < Z	0.2511
Two-Sided Pr > |Z|	0.5022
t Approximation	
One-Sided Pr < Z	0.2535
Two-Sided Pr > |Z|	0.5069

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.4749
DF	1
Pr > Chi-Square	0.4908

Analysis of Variance for Variable Q24
Classified by Variable Position

Position	N	Mean
Management	13	4.538462
Staff	21	4.285714

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	1	0.512928	0.512928	0.2854	0.5969
Within	32	57.516484	1.797390		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable Q24
Classified by Variable Position

Position	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score

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Management	13	229.0	227.50	27.239505	17.615385
Staff	21	366.0	367.50	27.239505	17.428571

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	229.0000
Normal Approximation	
Z	0.0367
One-Sided Pr > Z	0.4854
Two-Sided Pr > |Z|	0.9707
t Approximation	
One-Sided Pr > Z	0.4855
Two-Sided Pr > |Z|	0.9709

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.0030
DF	1
Pr > Chi-Square	0.9561