

**A QUALITY MANAGEMENT SYSTEM FOR THE NAMIBIA WATER
CORPORATION LIMITED**

by

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Declaration

I hereby certify that this dissertation was independently written by me. No material was used other than referred so. Sources directly quoted and ideas used, including figures, tables and drawings have been correctly denoted. Those not otherwise indicated belong to the author.

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A QUALITY MANAGEMENT SYSTEM FOR THE NAMIBIA WATER CORPORATION LIMITED

Executive Summary

A company cannot survive without giving attention to quality. Ensuring quality in products is so important that many companies give major attention to actively managing processes to make sure that quality permeates everything the company does. Quality management is a company's unique approach for addressing all aspects of quality. It requires vision, a quality policy, a quality standard, a quality system and the control of the system.

The water industry is a natural monopoly in which no competition exists to provide customers the opportunity to choose between different suppliers. Due to the monopolistic nature of a water utility, the tendency was previously to neglect the customer and his needs. For water utilities, the quality of the product water has always been the important factor mainly because of their responsibility towards the protection of public health. The quality emphasis was mainly towards meeting the demands of the primary and secondary sector of the water industry that is to provide water of an acceptable standard to the customers. It was only during the 1980's that water utilities became concerned about service quality in pursuance of the example set by the broader industry. Since then the emphasis on quality shifted gradually towards the tertiary sector of the water industry, the provision of quality services to the customer.

The Namibia Water Corporations Act, 1997 requires that a performance contract should be concluded between the owners of the company (the State) and the Corporation. It further requires that the Namibia Water Corporation (NamWater) should formulate and maintain service standards in respect of the provision of water, services or facilities. As both these requirements are primarily based on efficiency, performance,

achievements, cost-effectiveness and the optimum use of resources, there is a need to develop a system that will address all these aspects.

This document describes the outcome of a study to develop a quality management system for NamWater that will address all these aspects, to identify shortcomings within NamWater and to monitor progress regarding meeting the quality standards on a continuous basis. Together with the development of a proposed quality policy document, this study also resulted in the compilation of a proposed set of service standards as prescribed by the Namibia Water Corporation Act of 1997.

Performance gaps where existing practices in NamWater do not meet industry's best practice were identified by making use of performance indicators developed by the International Water Association (IWA) and the benchmarking exercise of the Water Utility Partnership (WUP). A set of performance indicators was developed to monitor the progress of NamWater in meeting standards on a continuous basis. The study concludes with a proposal for a quality management system for NamWater to ensure that the work is carried out in accordance with the quality policy and the quality standards.

To identify possible performance gaps in NamWater, the information from the Water Utility Partnership programme on performance indicators and benchmarking was used to evaluate the performance of the NamWater against other water utilities in Africa. In general terms, the performance of NamWater is better than in many other African countries. However, by evaluating the results of the benchmarking exercise performance gaps were identified within NamWater that needs urgent attention. This study identifies the Sales Process as being the area to concentrate on as a first priority, with the focus on the improvement of revenue collection, the improvement of customer relations and the decrease in total cost. The Support Process should be the second priority with the improvement of the asset management organisation high on the

list. There are two fields in the Production Process that needs special attention. They are unaccounted-for-water, and supply interruptions.

The identification of industry's best performers in the various fields where performance gaps exist is beyond the scope of this study. It will form part of the implementation phase of a quality management system for NamWater.

To monitor NamWater's performance on a continuous basis over time in meeting the requirements of the quality policy, various performance indicators have been identified. These indicators will also identify future performance gaps, determine various performance trends in the company, and measure and monitor the benefits of the implementation of best practice. Performance indicators were identified (from the IWA and WUP programmes) due to the fact that it will serve the above-mentioned purpose and it is compatible with the present situation within NamWater.

As can be seen from the performance gap analysis all three processes in the NamWater organisation have shortcomings that will have to be addressed through a quality management system. The situation is ideal for the implementation of TQM for NamWater. Such a project should be high on the priority list of the management of the company.

**A QUALITY MANAGEMENT SYSTEM FOR THE NAMIBIA WATER
CORPORATION LIMITED**

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CHAPTER 1

INTRODUCTION

Namibia is situated on the south-western coast of Africa and is surrounded by the Atlantic Ocean in the west, Angola and Zambia in the north, Zimbabwe and Botswana in the east and South Africa in the south and east. The climate is governed by the country's geographic position in the southern tropics and is further influenced by the cold Benguela current. These conditions result in a mean annual rainfall of only 250mm. Due to the low rainfall and high evaporation the country is regarded as an arid region.

The total population in Namibia is about 1,6 million people of which approximately 1,0 million live in a rural environment. The total land area is 823 000 km².

Despite the arid nature of the climate in Namibia and the adverse location of water resources in relation to areas with large consumers, a well-developed water supply infrastructure has been established over the years.

Bulk water supply in Namibia used to be the responsibility of the Department of Water Affairs. Shortly after independence in 1990, Government decided to launch an investigation into the water sector with the purpose of defining its overall objectives and policies. The findings of this investigation resulted in the rationalisation of the governmental water sector. The bulk water services were commercialised with the establishment of a water utility, while the conservation and control functions as well as the responsibility to supply water to the rural population remain with government. The distribution of water to individual consumers stayed with the various local authorities all over the country.

The Namibia Water Corporation Limited (NamWater) was officially registered as a company on 9 December 1997. The company was established in terms of the Namibia Water Corporation Act, 1997 (Act No 12 of 1997). It is a water utility operating on commercial principles, with the Government of Namibia as the sole shareholder. A Board of Directors, appointed by Government, ensures that NamWater utilises the scarce water resources of the country in the best interest of Namibia and its people. NamWater operates 190 water supply schemes throughout the country and supplies water in bulk to industry, municipalities, government departments and irrigation schemes.

According to the Namibia Water Corporation Act (Act No 12 of 1997), the object of the Corporation is to carry out the primary business of bulk water supply to customers in sufficient quantities of a quality suitable for the customers' purposes, and by cost-effective, environmentally sound and sustainable means. In addition the Corporation should carry out secondary business of rendering water-related services, supplying facilities and granting rights to customers upon their request.

The Namibia Water Corporations Act, 1997 requires that a performance contract should be concluded between the owners of the company (the State) and the Corporation. It further requires that NamWater should formulate and maintain service standards in respect of the provision of water, services or facilities. As both these requirements are primarily based on efficiency, performance, achievements, cost-effectiveness and the optimum use of resources, there is a need to develop a system that will address all these aspects. The objectives of the study as outlined in this document is to develop a quality management system for NamWater that will address all these aspects, to identify shortcomings within NamWater and to monitor progress regarding meeting the standards on a continuous basis. Part of the study was the formulation of a set of service standards in respect of the provision of water, services and/or facilities as required by the Namibia Water Corporation Act of 1997.

The study concluded with a proposal for a quality management system for NamWater.

It is envisaged that the implementation of the recommendations of this document will put NamWater in a position to comply with the Namibia Water Corporation Act of 1997 regarding all quality aspects of the company, to improve the quality of the product and services at competitive prices, and to deliver a product and service that will exceed the expectations of the customers in respect of excellent value for money.

Chapter 2 of this document deals with the theory behind quality management in general. It describes the role of performance indicators and benchmarking and concludes with a discussion on a total quality management approach in industry and the public sector.

In Chapter 3 the focus is on quality management in the water industry. Performance indicators and benchmarking in a water utility is dealt with in detail. The various fields in the water sector where quality management has an impact are discussed and the chapter ends with looking at a total quality management approach in the water industry.

The detail of the methodology used in this study is presented in Chapter 4, while Chapter 5 deals with the findings and conclusion of the study. A quality policy document and a set of service standards have been developed for NamWater and is presented in Annexures 4, 5 and 6. By making use of a benchmarking exercise developed by the Water Utility Partnership (WUP) for water utilities in Africa, various performance gaps have been identified in NamWater. To monitor NamWater's performance on a continuous basis over time in meeting the requirements of the quality policy, various performance indicators are proposed for implementation within the NamWater organisation. The study concluded with a proposed quality management system for NamWater.

Annexure 1 outlines the processes and organisational functions within a water utility. The performance indicators used in the Water Utilities Partnership (WUP) programme for water utilities in Africa is presented in Annexure 2, while Annexure 3 deals with performance indicators from the International Water Association programme that is suitable to be used within NamWater additional to those from the WUP programme.

CHAPTER 2

THE QUALITY MANAGEMENT PROCESS

2.1 HISTORY

The history of quality management reaches back almost a century, to Taylorism, with its industrial assembly line view of workers as components in tightly specified systems. In the 20s and 30s Walter Shewhart of Bell Laboratories identified the importance to vary the processes and products in such systems. To improve quality and productivity, they saw the need to control such a variation process (Macpherson, 1999).

In the boom that followed World War II, quality management was largely abandoned due to the rush for greater production volumes. However, during this period the situation in Japan, a country that was virtually destroyed during the war, forced companies to restrict the waste of raw materials to a minimum. In addition, the available work force needed to be deployed to such an extent that their effectiveness and efficiency is optimised. Within the scope of the Mac-Arthur Plan the American quality experts Juran and Deming were invited to assist the Japanese industry in its redevelopment of their quality philosophy (Bosman 1994).

It was not until Edwards Deming's holistic, systematic approaches to quality were proved to be successful in Japan in the late 50s and the 60s that quality management regained momentum in industrial societies (Macpherson, 1999).

2.2 QUALITY AND QUALITY MANAGEMENT

The concept of quality is not easy to define. Quality has various meanings to different people, depending from which angle one sees it.

Every definition of quality highlights a different aspect thereof. We shall have a look at a number of these definitions.

According to Rhodes University (2002), quality may have more than one interpretation that could include

- Value for money
- Excellence
- Zero defect
- Customer satisfaction
- Fitness for Purpose

Heizer (2001) describes quality as the ability of a product or service to meet customer needs in the most economical way. However, the definition of quality could fall into several categories.

- User based – Higher quality means better performance, nicer features, and other improvements
- Manufacturing based – Quality means conforming to standards and ‘making it right the first time’
- Product based – Quality is a precise and measurable variable

Macpherson (1999) is of the opinion that to ensure the quality of products and services at competitive prices the emphasis should be on doing the right things (the question of what to do) as well as doing things right (the question of how to do things right). A TQM system in a company ensures that organisations do the right thing, while prescribed standards such as ISO 9000 is about doing things right.

Tritsmans-Sprengers (1994) also stresses that the golden rule in any organisation is getting things done correct from the start (doing the right things right). It is much more cost effective than having to make corrections afterwards.

Whatever definition of quality is decided on, a company cannot survive without giving attention to quality. As a matter of fact, Fry et al (2001)

stated that ensuring quality in products is so important that many companies give major attention to managing quality. This should be more than just encouraging quality. It means actively managing processes to make sure that quality permeates everything the company does. Quality management is a company's unique approach for addressing all aspects of quality.

Quality management starts from the strategic plan of the company which maps out where the organisation is heading, its short-range and long-range performance targets, and the competitive moves and internal action approaches to be used in achieving the targeted business results (Thompson & Strickland, 2003).

According to Bosman (1994), quality management requires vision, a quality policy, a quality standard, a quality system and the control of the system.

- **Vision**

Quality management should

- Evolve from the strategic plan of the business
- Be based on stakeholders' expectations

- **Quality Policy**

A quality policy includes

- Setting measurable objectives
- Identify restrictions and preconditions in respect of these objectives
- Identify priorities
- Identify the means and methods by which the objectives will be achieved

- **Quality Standard**

As a basis for the quality system, quality standards to be used must be identified and adopted.

- **Quality System**

A quality system comprises the correct organisational structure of the company, as well as the allocation of responsibilities and authorities, and the implementation of procedures and processes required for implementing the quality policy.

- **Quality Assurance**

Assessing the quality system against the chosen quality standard is of utmost importance. It is necessary to be able to show that the work is carried out in accordance with the quality system. The extent to which the quality system meets the standard that has been set is checked by means of structured assessment. It is also checked whether the system is applied effectively. Audit results are the basis to decide on the implementation of improvement processes.

2.3 PERFORMANCE INDICATORS AND BENCHMARKING

Performance indicators and benchmarking are management tools to assist with quality management.

2.3.1 Performance Indicators

Performance is taken to be a collective measure of efficiency and effectiveness. Efficiency is concerned with the relationship between input and output in the production process, such as cost productivity and the extent to which the resources in a company are utilised optimally to ensure a high quality (doing things right). Effectiveness is concerned with the benefit to customers and the extent to which declared objectives are achieved (doing the right things). Benefits can be associated with service quality (Moy, 1994).

A performance indicator is a quantitative measure of a particular aspect of the undertaking's performance. It is ratios or simple mathematical relationships between key variables in the system. It assists in the monitoring and evaluation of the efficiency and effectiveness of the

undertaking. It facilitates the implementation of benchmarking routines, both internally (by comparing the performance of different sections or systems) and externally (by comparing performance with other similar undertakings). Performance indicators are decision-making tools. No benefit will result from a performance indicator system if the information is not interpreted correctly.

2.3.2 Benchmarking

2.3.2.1 Definition of Benchmarking

Fry et al, (2001, p353) describes benchmarking as the process whereby managers compare their practices to the practices of recognised leaders in the industry to see where and how improvements can be made. According to him, benchmarking follows a three-step process. First, management identifies and studies quality leaders to see what they are doing. The second step is identifying critical success factors. The final step is forming goals and plans for implementing the critical success factors in the benchmarker's own facilities.

According to Alegre et al (2000), benchmarking is the comparison of the processes and systems of a given business function across companies. It can be applied to any area of an organisation. It is a way for managers and employees to compare their functional performance to that of other companies, particularly those that excel, and identifying why they may differ. Benchmarking can therefore be defined as:

- Measuring your performance against that of best-in-class companies
- Analysing how the best achieve their performance level, and
- Using the information as the basis for evaluating your own targets, strategy, and organisation.

The American Water Works Association (AWWA) defined benchmarking as a systematic process of searching for best practice, innovative ideas, and highly effective operating procedures that lead to

superior performance, and then adapting those practices, ideas, and procedures to improve the performance of one's own organisation (Larsson et al, 2002).

Ramsey & Mobbs (2001) sees benchmarking not only as a comparison of measures or indicators aimed at highlighting the company's position on a scale from worst to best. It is also a tool with which one can understand the processes that achieved the best performance from each key area and then import them into the organisation. Implementation is vital to any benchmarking exercise, and the will to change practices and to implement changes for the good must be present from the commencement of any benchmarking exercise.

According to Byrne et al (2003), benchmarking should be:

- Measurable and quantifiable
- Repeatable
- Capable of monitoring improvements
- Capable of providing confidence in the process followed
- Capable of being updated and improved as new processes and equipment technical advancements are identified.

It does not matter which definition for benchmarking is used, all definitions culminate into the implementation of appropriate best practice such that best performance is achieved.

Benchmarking is a powerful tool to identify potential improvement areas within a company and by implementing changes in accordance with best industry practices, improve the strategic management of the company.

Benchmarking consists of two parts, metric and process. Metric benchmarking provides the information for a utility to identify those areas where there are apparent performance gaps. It is like a golf scorecard. It tells you how good you are, but not how to improve. Process benchmarking tells you how to improve on your performance;

that is to identify and implement the best practice for filling the gaps. In other words, metric benchmarking identifies areas of underperformance requiring changes to be made, whereas process benchmarking provides ways of achieving this change and the required improvement (with adoption and amendment to comply with a company's specific requirements).

2.3.2.2 Metric Benchmarking

Metric benchmarking is a quantitative comparative assessment of company performance against other organisations or self over time, normally measured by making use of performance indicators. It is a process of accumulates data to facilitate objective comparisons between companies externally or internal comparison of similar systems in different locations. The purpose of the external comparison is to identify industry's best performance company, to find the apparent performance gap between your company and industry's best performing company, and to monitor performance and improvement over time.

The collection of data is an integral part of metric benchmarking. Data are collected to calculate a range of performance indicators with the aim to focus attention on key issues or areas where there are opportunities for improvement in performance or efficiency. It is the performance indicators that drive the data collection process. (Ramsey & Mobbs, 2001).

2.3.2.3 Process Benchmarking

Process benchmarking utilises the metric benchmarking output as a basis for bridging the apparent performance gap such that best performance is achieved. It is the analysis of a company's own business processes in comparison with the same processes in organisations with excellent performance in those areas, and the adaptation of those processes to your company's own circumstances, with the intention to implement it in your organisation.

According to Ramsey & Mobbs, (2001), there are five steps in the implementation of process benchmarking.

- Identifying key focus areas for comparison
- Gathering internal data for those key focus areas
- Identifying potential benchmarking partners
- Preparing for and undertaking benchmarking visits
- Implementing best practices

- **Identify key focus areas for comparison**

The first step is to identify key focus areas where performance gaps exist, by making use of the output of the metric benchmarking exercise. The use of performance indicators is the first stage in the identification process of key focus areas. The impact of factors unique to each company that may close or widen the apparent performance gap should also be considered. From the analysis of performance indicators and circumstantial factors, every company will be able to identify its own potential key focus areas.

These focus areas should be prioritised, as it is probably not possible to address all the areas at once. It is important to differentiate between those areas which cannot be changed and those where there is not the will to change.

- **Gathering internal data for those key focus areas**

Information is needed for a company to ensure a greater degree of understanding of the identified key focus areas. Gathering of internal data related to those identified key focus areas is therefore an important aspect of every company.

- **Identifying potential benchmarking partners**

Establish at what level benchmarking partners are to be sought (within the region, world-wide, out of industry) and identify appropriate benchmarking partners.

- **Preparing for and undertaking benchmarking visits**

Benchmarking visits should be scoped, planned, undertaken and recorded for later reference.

- **Implement best practice**

Adopt, adapt or amend selected best practices of the superior performers to comply with the specific circumstances within your company, and integrate these into the key focus areas of the organisation. Not all best practice is appropriate for implementation in another utility and often best practice cannot be implemented in its entirety or without appropriate modification to the circumstances of the benchmarking company (Ramsey & Mobbs, 2001). The important thing is to identify best appropriate practices (those world class practices that fit the organisation's needs) and to map a work plan and measure progress against that benchmark (Byrne et al, 2003).

Not all changes can be implemented at once and some take longer than others to implement. Where there is a range of changes to be implemented it is important that these are prioritised and implemented in an organised and measured manner.

The benefits of the implementation of best practice, whether in terms of cost reductions or improved performance, should be measured and monitored, as it will give impetus to further benchmarking exercises. Benchmarking exercises should be done on an ongoing basis.

2.4 TOTAL QUALITY MANAGEMENT

2.4.1 What is Total Quality Management?

Total Quality Management (TQM) takes quality management a step further. Bosman (1994) and Hoekstra et al (1994) described *Quality Management* as the attention that is paid to quality within a company to

achieve customer satisfaction and long-term profitability of the organisation, taking the requirements of the society into account. The word *Total* refers to all quality aspects within a company such as its products and services, its activities and its goals.

Total Quality Management is defined in different ways in the literature. The following definitions cover more or less the broad spectrum of TQM.

- Total Quality Management (TQM) is an approach for continuously improving the quality of goods and services delivered through the participation of all levels and functions of the organization (Pfau, 1989).
- Total Quality Management is a structured system for satisfying internal and external customers and suppliers by integrating the business environment, continuous improvement, and breakthroughs with development, improvement, and maintenance cycles while changing organisational culture (www.iqd.com).
- Total Quality Management (TQM) is a management approach advocating the involvement of all employees in the continuous improvement process – not just quality control specialists (Schlenker, 1998).
- The TQM philosophy of management is customer-oriented. All members of a total quality management (control) organisation strive to systematically manage the improvement of the organisation through the ongoing participation of all employees in problem solving efforts across functional and hierarchical boundaries (Schlenker, 1998).

- TQM is the management of an entire organisation so that it excels in all aspects of products and services that are important to the customer (Heizer, 2001, p174).
- TQM is a philosophy of managing a set of business practices that emphasizes continuous improvement in all phases of operations, 100 percent accuracy in performing activities, involvement and empowerment of employees at all levels, team-based work design, benchmarking, and fully satisfying customer expectations (Thompson & Strickland, 2003, p395).
- TQM is an organisation-wide approach to continuously improving the quality of all organisation's processes, products, and services (Kotler, 2000, p56).
- The Deming Prize Committee defines TQM (revised in June 1998) as follows: TQM is a set of systematic activities carried out by the entire organisation to effectively and efficiently achieve company objectives so as to provide products and services with a level of quality that satisfies customers, at the appropriate time and price.

Total Quality Management can therefore broadly be defined as follows.

TQM is a company-wide commitment towards the continuous improvement of the quality of all aspects of the company's processes, products, and services important to the customer. To be a success, it needs a quality culture in the company and is therefore a philosophy driven from top management. It is an involvement, empowerment, commitment and ongoing participation of all employees at all levels across functional and hierarchical boundaries. It is a customer-oriented approach that fully satisfies customers' and suppliers' needs and expectations.

Total Quality Management should be seen as a process, not a programme (Gummer, 1995). The driving forces behind TQM are “highest quality” and “customer satisfaction” and the major role-players to the success of the process are the company, the top management of the company, all employees of the company, and the customers and suppliers.

2.4.2 Participants in the Total Quality Management Process

2.4.2.1 The Company and its Organisation

The company is the environment in which the entire process of TQM is accommodated. All aspects of the business processes within a company such as production methods, production processes, workflow, equipment, and procedures, are subjected to continuous improvement. The quality that comes out of a process is affected by the quality of what goes in and what happens at every step along the way. It follows that quality must be built into every step, process, and system to produce quality in the outcome.

TQM needs appropriate procedures and integrated and structured systems and a set of systematic activities. The entire organisation and structure of a company should be built around TQM.

2.4.2.2 Top Management

Quality is a strategic issue and therefore top management should be the driving force behind TQM (Thompson & Strickland, 2003). Successful implementation of TQM initiatives requires a substantial investment of management time and effort.

TQM is expensive and it seldom produces short-term results. The long-term payoff depends heavily on management's success in instilling a culture within which TQM philosophies and practices can thrive to achieve the targets and performance measures that the company strategy requires.

If the targeted performance measures are in line with the strategy and if all organisational members (top executives, middle managers, professional staff, and line employees) buy into the process of continuous improvement, then the work climate will be conducive to proficient strategy execution and good business performance.

2.4.2.3 All Employees

TQM is an involvement, empowerment, commitment and ongoing participation of all employees at all levels and functions in the organisation. People from different areas of the business come together to address customer needs and learn how everyone can help deliver customer satisfaction (Fry et al, 2001, p353). An indication of the successful implementation of TQM in a company is when all employees at every level participate in decisions affecting their work. A participative work culture is encouraged when quality becomes everybody's responsibility. Pushing problem solving and decision making down in the organisation allows people who do the work to both measure and to take corrective action in order to deliver a product or service that meets the needs of their customer. The success of quality improvement is based on the understanding of every member of the organisation concerning the needs of their customers (internal and external).

2.4.2.4 Customers and Suppliers

One of the major values customers expect from companies is high quality products and services. Most customers will no longer accept or tolerate average quality. If companies want to stay in the race, let alone be profitable, they have no choice but to adopt total quality management (Kotler, 2000, p56).

TQM begins with careful market research to assess customer needs. Designers, development staff, and engineers must be able to take customer desires and translate them into winning, high-quality product designs. Manufacturing must be able to produce these quality products at

reasonable cost. Finally, the products must be delivered in a timely and convenient way so customers receive satisfaction (Fry et al, 2001, p353).

Each employee in the value chain is a customer of preceding employees in the value chain and each has customers, who are the people who receive the results of his or her work. Likewise, the people outside the organisation who sell materials, information or services to be used by employees are external suppliers. A company's external customers purchase a product or service and contribute to profits. They must ultimately be satisfied if the business is to survive.

2.4.3 Why Total Quality Management?

Bosman (1994) is of the opinion that the decision to introduce TQM is based on both internal and external considerations.

External considerations could be

- **Technical:** improvement of quality
- **Market:** Competitive position
- **Public Relations:** Improvement of image
- **Legal:** Limiting the liability
- **Moral:** Environmental aspects
- **Society:** Client expectations
- **Branch:** Membership and moral commitment
- **Governmental and law:** Obligation of conformity
- **Chain:** Supplier-client relation

Internal considerations could be

- **Technical:** Preventing failures
- **Economic:** Preventing waste
- **Social:** Job satisfaction and involvement

The Union of Japanese Scientists and Engineers (2003), has identified 10 aspects of a business that can benefit from a TQM approach.

- Consistency and improvement in the quality of products and services
- Productivity improvement and cost reduction
- Increase in sales
- Increase in profits
- Implementation of management and business plans
- Realisation of top management's dreams
- Total participation and improvement and strengthening of the organisational structure
- Increased motivation to manage and improve as well as to promote standardisation
- Combined total organisational power and improving morale in the company
- Establishment of various management systems and the culmination thereof in a total management system

The above-mentioned are all valid reasons for implementing TQM and should be taken into consideration when deciding on TQM in a company. The introduction of TQM in the organisation is a process of continuous effort on the part of everyone and it can take a number of years before the advantages and cost effectiveness of the process will become visible. It is therefore important to ensure that all aspects related to TQM has been evaluated and considered in detail before the final decision for implementation is taken. Once a company has decided to implement TQM, it must become a long-term culture in the company.

2.4.4 The Implementation of Total Quality Management

As total quality management is a long-term investment, the total environment in and around the company should be conducive for the implementation thereof to ensure success.

Thompson & Strickland (2003, page 397) identified twelve common factors for putting in place a TQM system in a company. They are:

- Committed leadership

- Adoption and communication of TQM
- Closer customer relations
- Closer supplier relationships
- Benchmarking
- Increased training
- Open organisation
- Employee empowerment
- Zero-defects mentality
- Flexible manufacturing
- Process improvement
- Performance measurement

According to Thompson and Strickland (2003, p400), the action steps that should be taken during the implementation of TQM include:

- Visible, unequivocal, and unyielding commitment to total quality and continuous improvement, including a quality vision and specific, measurable objectives for boosting quality and making continuous improvement.
- Nudging people towards TQ-supportive behaviours by initiating organisational programs such as
 - Screening job applicants rigorously and hiring only those with attitudes and aptitudes right for quality-based performance
 - Quality training for most employees
 - Using teams and team-building exercises to reinforce and nurture individual effort
 - Recognising and rewarding individual and team efforts regularly and systematically
 - Stressing prevention (doing it right the first time), not inspection (instituting ways to correct mistakes)
- Empowering employees so that authority for delivering great service or improving products is in the hands of the doers rather than the overseers

- Using online systems to provide all relevant parties with the latest best practices and thereby speeding the diffusion and adoption of best practice throughout the organisation. Allowing them to exchange data and opinions about how to upgrade the prevailing best practices.
- Preaching that performance can and must be improved because competitors are not resting on past laurels and customers are always looking for something better.

Gummer (1995) considers the alignment between various organisational systems (such as human resource systems, information systems and financial management processes) as a key factor for the implementation of TQM. He also sees a different organisational structure under TQM. Layers of management may be reduced and organisational roles will certainly change. In particular, middle management and first line supervisors will be operating in new ways. Instead of acting as monitors, order givers, and agents of control they will serve as boundary managers, coordinators, and leaders who assist line workers in getting their jobs done.

Gummer (1995) is convinced that TQM should evolve from the organisation's strategic plan and be based on stakeholder expectations. TQM should be purpose oriented; it should be used because an organisation's leaders feel a need to make the organisation more effective. It should be driven by results and not be seen as an end in itself.

According to Bosman (1994), the following conditions must be met for the successful introduction of TQM.

- Absolute dedication on the part of management
- A consistent policy, identifiable for everyone and linking up with the structure and culture of the company

- **Targets (with time limits) which are challenging, realistic and measurable**
- **An open communication structure, top down – bottom up**
- **Quality awareness based on a continuous emphasis on the customer**
- **Tailor-made directions, training and shaping to be in line with the objectives of the company**
- **Involving all levels and employees in the implementation process**
- **Step by step development.**

In summary, the factors to take into consideration for the successful implementation of TQM in a company are:

- **Leadership commitment and dedication towards TQM**
- **Committed employees (from the CEO to the labourer) towards a zero-defects mentality**
- **Continuous preaching and communication of TQM at all levels in the company**
- **The organisation's strategic plan should be the starting point for developing a TQM policy**
- **The organisation's structure should move from the traditional hierarchical structure towards a lean structure which allows for open horizontal communications**
- **Setting of targets**
- **Empowerment of employees**
- **Appoint only those persons with attitudes and aptitudes right for quality-based performance**
- **Increased employees' training on quality issues**
- **Recognise and reward employees commitments and initiatives towards TQM**
- **Closer customer relations**
- **Closer supplier relations**
- **Process improvement**

- Benchmarking and constant performance measurement and feedback

The employees in a company (from the highest to the lowest level) are the key to the successful implementation of TQM. Management should ensure that the correct climate and structures are created within the company to make it easy for the rest of the company to follow. It is a matter of leading by example.

2.4.5 Total Quality Management in the Public Sector

Public institutions are unique because top leadership is elected and the stability in management style and management philosophy may be limited. Furthermore, public agencies are not driven by profit motive.

The public sector has a large number of employees and represents a significant proportion of the workforce in a country. The effectiveness of the public sector is crucial for the country's competitiveness. In effect, the public sector does not contribute directly to the gross domestic product, and must be as efficient as possible so as not to drain needed resources from the manufacturing and service sectors. The public sector must also be responsive to citizen needs and expectations. Poor quality does not only raise the production costs of manufactured goods, it also raises the cost of services, including public services, which impacts directly on the cost of government. Thus, public sector organisations deserve special attention as far as the implementation of quality improvement practices and philosophies is concerned, since the effectiveness of these organisations affects the quality of life and the tax "burden" of both industry and individuals (Saintfort & Carayon, 1997).

There has been a growing debate regarding the applicability of TQM principles and techniques to the public sector. Four problems have been identified when attempting to implement TQM in the public sector: definition of customers, services instead of products, focusing on inputs and processes, and government culture (Saintfort & Carayon, 1997).

Although originally applied to manufacturing operations, and for a number of years only used in that area, TQM is now becoming recognised as a generic management tool, just as applicable in service and public sector organisations. Just as other management tools are universal and transferable across the public/private divide, so are quality strategies.

CHAPTER 3**QUALITY IN THE WATER INDUSTRY****3.1 INTRODUCTION**

The water industry can be seen as a natural monopoly in which no competition exists where customers can choose between different suppliers. Traditionally there are a limited number of water utilities in a country. This is mainly due to the large capital layout needed to operate a water company. Not many entities are able to raise the necessary funds to enter the bulk water market.

Due to the monopolistic nature of a water utility, the tendency was previously to neglect the customer and his needs. For water utilities, the quality of the product water has always been the important factor mainly because of their responsibility towards the protection of public health. The quality emphasis was towards meeting the demands of the primary and secondary sector of the water industry. It was only during the 1980's that water utilities became concerned about service quality in pursuance of the example set by the broader industry. Since then the emphasis on quality shifted gradually towards the tertiary sector of the water industry.

This aspect is also emphasised by Bea-Gil (1994). According to him quality in the water industry is not just related to the physical aspects of water such as the supply of good quality water, sewage treatment, quality of the water supply infrastructure etc. Although all these factors are important, quality should be an integral part of the total management concept of the utility. The quality issues include the quality of the services rendered to the customers, the quality of environmental protection, the quality of the company as an organisation and the quality of the final product.

3.2 QUALITY MANAGEMENT IN A WATER UTILITY

3.2.1 Quality Contracts

The quality of services and products provided by a water utility are governed by a quality policy. The quality aspects reflected in the quality policy document are obtained from the Strategic Plan of the company. The quality policy is implemented by means of a quality contract between the water company and the authority they serve.

3.2.2 Performance Indicators and Benchmarking

To comply with the stipulations of a water quality contract, the service standards must be measurable. For this purpose, a set of performance indicators is used to monitor the performance of the company regarding all quality aspects. The levels of the service standards are set by making use of a benchmarking exercise.

The water industry is in the fortunate position that there are various water utilities in Africa and the rest of the world to benchmark against. There are a couple of programmes around the world for the development of performance indicators and benchmarking programmes for the water industry. The International Water Association (IWA) has launched two projects. The one is for the development of performance indicators for water supply services and the second one is aimed at process benchmarking in the water industry towards a worldwide approach. The Water Utilities Partnership (WUP) for capacity building in Africa project on performance indicators and benchmarking is based on the IWA indicators but focused on water utilities in Africa.

3.2.2.1 IWA Programme

The International Water Association (IWA) has been developing a set of performance indicators for the water industry. The list of indicators presents those indicators considered as the most relevant for most water utilities, to be used on a routine basis. The structure adopted for the indicators derives from the fact that they need to be applicable to undertakings with different internal organisations (Alegre et al, 2000).

3.2.2.2 WUP Programme

The Water Utility Partnership (WUP) for capacity building in Africa was established in 1996 with the support of the World Bank. The WUP programme includes five main projects of which Performance Indicators and Benchmarking is one. The main aim of this project is to provide a management tool for self evaluation for the operators, benchmarking for utilities with similar operating environments, promoting experience sharing between the utilities and documenting and sharing information on emerging best practices and lessons on water supply and sanitation in Africa. It also aims to promote accountability and transparency in the operation of the utilities leading to higher efficiency and effectiveness (Ramsey & Mobbs, 2001).

The WUP project culminated in a database on various performance indicators in the water sector from 110 African water utilities (December 2001). This database is updated from time to time. The latest information available is dated July 2002. An update was being done during 2003. The final document on this latest update is not available yet.

The conclusion of the WUP project will not be the collection of metric data or the calculation of performance indicators, but rather the identification of performance gaps, benchmarking against superior performers and the implementation of performance improvements.

The identification and definition of performance indicators has been a major component of this project. It was based on the following reasons.

- The availability of data in the various water utilities in Africa for comparative purposes
- The balance between what is desirable and what is achievable in terms of what data and information is sought

- Making use of existing performance indicators and definitions (such as the IWA program on performance indicators as set out above) rather than “re-inventing the wheel”

Annexure 2 contains all the performance indicators used by the WUP programme.

3.2.2.3 Process Benchmarking in the Water Sector

Larsson et al (2002) developed a model showing the various business processes carried out by water supply companies. The model grouped the various tasks of a water utility into four business processes namely Support, Sales, Production and Distribution. The four identified processes in a water utility are normally evaluated by making use of a process benchmarking exercise. These processes are described in detail in Annexure 1 and can be summarised as follows.

Support

- Developing of strategic planning and policies
- Public relations
- Technical planning and design
- Economic/financial affairs
- Personnel administration
- Information technology and processes
- General Services
- Purchasing and materials management

Sales

- Meter reading and processing meter reading data
- Invoicing, debt management and collection
- Customer relations and management
- Marketing

Production

- Operating of bulk water supply facilities

- Maintaining of bulk water supply facilities
- Construction of bulk water supply infrastructure
- Managing of catchment areas and water protection areas
- Water resource management
- Water quality monitoring, sampling and analysis

Distribution

- Operating water distribution systems
- Maintaining of water distribution systems

3.2.2.4 Metric Benchmarking in the Water Industry

Alegre et al (2000) grouped the various tasks necessary in a water utility to carry out the four business processes, into seven functions. These functions are further grouped into four main organisational functions. The suggested functions and related tasks are as follows (Annexure 1).

Management and Support

- Global Management
 - Central administration
 - Strategic planning and policies
 - Public relations
 - Legal affairs
 - Internal audits
 - IT and automation
 - Environmental management
- Administrative Management
 - General Secretary
 - Archiving
- Personnel
 - Personnel administration
 - Education and training
 - Recruitment
 - Occupational health and safety
 - Social activities

Financial and Commercial

- Economic and financial planning
- Financial administration
- Economic control
- Purchasing and material management

Customer Service

- Meter reading and processing
- Invoicing, collection and debt management
- Customer relations and management
- Marketing

Technical Service

- Planning and construction
 - Technical planning and design
 - Construction
 - Resource management
 - Water conservation programs
- Operations and maintenance
 - Operations
 - Maintenance and repair
 - Water quality monitoring

The performance indicators for water supply services developed by IWA and used by the WUP in their benchmarking programme are aimed at measuring the performance of the various functions in the water industry (Annexure 2). These are done by way of a metric benchmarking exercise.

3.2.3 The role of quality management in the water sector**3.2.3.1 Introduction**

Simon (1994) gives a true reflection of the business environment in which a water utility operates. According to him, water utilities are

amongst the most complete businesses in the industry, since they play a role in all three sectors of the economy.

The primary sector: the utility extracts the raw material (water) from its natural environment.

The secondary sector: the treatment of water is equivalent to the production operation in the industry.

The tertiary sector: services offered to the customers such as the distribution of water, meter reading, billing, and client contact.

The next paragraph illustrates the influence that quality or a lack of quality has on all three sectors in the water industry.

3.2.3.2 The Various Fields in the Water Sector where Quality Management Plays a Major Roll

3.2.3.2.1 Quality Issues in the Primary and Secondary Sectors in the Water Industry

The primary sector in the water industry covers the sourcing of raw water, while the secondary sector deals with the treatment of the raw water to a potable (drinkable) standard and the storage of the product water before it is being distributed to the consumers. During these two stages, quality is centered around the quality of the final product. This includes complying with water quality standards, the performance and maintenance of water supply infrastructure, and the control of cost in the various processes.

3.2.3.2.1.1 Product Water Quality

The quality of water produced for potable (drinkable) use is not negotiable. To prevent the outbreak of water born deceases and to have the aesthetic appearance of water acceptable for the consumer, the quality of the product water should be of the highest standard. There can be no compromises on the quality of water produced for domestic use. It should not be a matter of continuous improvement of the quality of the water but to maintain the highest quality of potable water on a continuous basis.

The main contributing factors towards water quality problems during the primary and secondary phases in the water industry are poor raw water quality, inferior treatment plant process designs and the human factor related to inadequate training and the lack of commitment from the operators on the plant.

To operate a treatment plant that has inherent defects due to a bad process design could be costly and uneconomical. At such a plant, high levels of skills are needed to manage around the problem areas. It could also result in uneconomical use of chemicals to overcome the inherent inefficiency of the plant. Due to the fact that water in itself has no monetary value and that it is the cost of treatment, and the transport and storing of water that gives it a monetary value, an inferior treatment plant could have a major impact on the cost of water.

A water utility must adopt the quality standard that will be used in the organisation. This standard may be derived from existing national quality standards such as legal requirements in a country or requirements established in consultation between the producer and the client or other competent regulatory body, or requirements set by stakeholders. It can also be derived from international quality assurance standards, such as the ISO 9000 series, the World Health Organisation Guidelines for Drinking-Water Quality 1993 and the European Commission Directive on the quality of water intended for human consumption, 1998

3.2.3.2.1.2 Water Supply Infrastructure Performance

The total water supply infrastructure network is by far the largest item on the books of a water utility, both in terms of investment cost and in terms of running costs. It is therefore of utmost importance to measure the supply network's performance in financial terms and to monitor trends. The main factor that determines the performance of a

network is the volume of water losses in the network. Network output is the major criterion used to evaluate network performance. The output of a network is the ratio between the quantity of water effectively used, and the quantity of water fed into the network (Demassue, 1994).

3.2.3.2.1.3 Maintenance of Infrastructure

A proper maintenance program is essential to achieve consistent quality of product water and service to the consumer. According to Janssens et al (1994), water utilities have lagged far behind the manufacturing industry in maintenance management. This can be attributed in part to the fact that maintenance problems that could result in loss of production of goods have more immediate quantifiable effects on sales and profits in the manufacturing industry than a similar problem in the water industry.

Maintenance programmes on water supply infrastructure should be guided by a maintenance policy that provides for the correct ratio between preventative or scheduled maintenance and remedial maintenance or break stop situations (unplanned or non-scheduled). According to Janssens (1994), good maintenance policies ensure the enhancement of the quality of service, extending the useful life of water supply infrastructure, postponing investments in new infrastructure, and improving financial performance. Bad maintenance policies and practices can result in long periods of down time having a negative effect on the performance of the plant. Equipment breakdowns are often used as excuses for performance problems.

The maintenance policy in a water utility is closely related to the asset management policy of the company. In water utilities, the problem of deferring maintenance and asset replacement leads to potentially higher capital expenditure in future years. The problem is further aggravated by the long life of the assets, which makes capital

investment predictions difficult. This leads potentially to the assets being maintained either too early or too late in its life, either creating unnecessary maintenance expenditure or exposure to unnecessary risk. Byrne et al, (2003) sees a well-planned condition-monitoring programme as an essential tool to understand residual asset lives and future maintenance costs. According to them a condition-based approach to maintenance has shown savings over the simple time-based approach. The degree and quality of maintenance is directly related to the residual life of the asset, and investment should be targeted where most benefit is derived.

3.2.3.2.1.4 Cost Reduction

The pressure to reduce capital and operating costs is present in every company in the world. The water industry is no exception in this regard. According to Byrne et al (2003) there are internal and external pressures on a company to reduce cost. External pressures are legislative demands, political pressure, regulatory pressure, statutory duties, customer pressure, environmental groups, health issues and shareholder requirements. Internal pressures include corporate policies, improved return on capital, reduced fixed costs, stakeholders' requirements and improved compliance standards. These factors are not always present in companies in other industries. However, it has a significant influence on income generation in a water utility. The difficulty in the water sector is to reduce cost without sacrificing quality.

3.2.3.2.2 Quality Issues in the Tertiary Sector of the Water Industry

During the tertiary stage in the water industry, the emphasis regarding quality moves to the customer and the quality of the services rendered. It also focuses on the public at large, the training of employees and the organisational functions in a water utility.

3.2.3.2.1 Customer Protection

To protect the customer from monopoly abuse by water utilities, governments in many countries have introduced a regulator. The regulator's primary duty is to protect the interest of customers by controlling the water prices without compromising the quality of water produced by the water utilities. Water companies should also be able to carry out their functions within the financial constraints imposed on them by the regulator. They are expected to operate with a lower return on investment and to reduce costs by greater efficiency in their operations. Utilities are also generally expected to improve their standard of service to customers from greater efficiency rather than higher prices. Customers regard the continuous supply of safe, acceptable tap water to be the essential element of a water service. Customers want value for money and judge this by what comes through the tap (Gardner, 1994).

Another type of regulation comes from the owners of the company. The majority of water utilities are governed by a Board of Directors. Various contracts between the Board and the management of the company should be in place such as management contracts, performance contracts, quality contracts and service standards. The main aim of all these types of contracts is to ensure a quality product to the consumers at a reasonable price.

According to Byrne et al (2003) regulatory and stakeholder pressure on water utilities means they must embrace a programme of continuous improvement to meet these powerful expectations.

3.2.3.2.2 Quality of Service

Service quality is generally defined as the difference between the client's expectations with regard to the service and the perception of quality after having used the service. However, this concept is not easily adaptable to companies in the water industry who

simultaneously offer both a product and a service, since product quality is indissolubly related to service quality (Simon, 1994).

According to Merlo & Parena (1994), service quality in the water industry relates to:

- The supply of water in terms of uninterrupted supply, adequate pressure at the point of supply and unrestricted supply.
- Emergency services in terms of high priority repairs to any breakdowns, and in time customer warning at times when the service has to be interrupted for repairs.
- Sound relations with the customers in terms of prompt reaction on requests for new connections or complaints, the supply of water related information, accurate water metering and invoicing and convenient payment systems.

Merlo & Parena (1994) is of the opinion that the aspects of service quality in the water sector are not governed by specific standards, and there are no well-defined target values to concentrate your efforts on. The evaluation of water services quality is characterised by its subjective nature. Gundermann (1994) says that in general it is easy to improve the quality of service but to measure the improvement is much more problematic.

Trends measured over time of the various service quality aspects in a water utility give an indication of the progress made regarding the improvement in service quality. Aspects such as the number of supply interruptions, the time-span of each interruption, the pressure changes at the supply point, turn around time for emergency repairs, and the accuracy of meter readings can be measured.

3.2.3.2.2.3 Customer Care

All over the world the water supply industry has made important progress in customer care within the last decade. It has changed from

a traditional water supplier to a service industry that sees itself as a partner of its customers that have their interests at heart. Water suppliers have relied historically upon meeting water quality standards without necessarily considering whether the customer are actually satisfied with the end product. Nowadays, to be successful it is important for the service provider to know the expectations and demands of the customer and match it with the abilities of the company.

One aspect in the water industry that has a major impact on customer relations is the water accounts submitted to customer. It is an important document to promote healthy customer relations. All over the world the water bill is a necessary evil that is not always welcome. The invoice should never been seen as the only link between the customer and the company. It should be an important “visiting card” of the water utility. For example, the invoicing methods should be customer-orientated. The layout of the invoice should not be confusing and complicated as it could easily turn out to be in the water industry. Water utilities have to learn that ordinary people have problems with the legibility of the normal water bill and that the structure of the invoice is often really complicated (Gundermann, 1994).

Customer care is closely related to the quality of service. The driving force behind service quality is to satisfy the customer. In the water industry with its monopoly environment, a special effort is needed to ensure highly satisfied customers.

3.2.3.2.2.4 Public Awareness

There is a widespread “water illiteracy” among the public in general. They consider the product of a water utility (drinking water) as obvious, a common every day commodity that will always be on hand when a tap is opened. The water is there when it is needed and disappears after use. They do not realise all the processes and

organisation behind the scenes to ensure that the final product (a good quality water) ends up in the tap. As soon as something goes wrong (temporary decline in water quality, interruption in water supply due to infrastructure failure, etc.) every consumer is upset and forgets the years of excellent service received in the past (Forsberg, 1994).

The public image of a water utility relates directly to the quality image of the company. The company should demonstrate to the public by providing excellent service and products on a continuous basis by all stakeholders of the company.

3.2.3.2.2.5 Training

According to Phillips (1994), the competence of the unskilled workforce in the water industry is something that has largely been taken for granted with a job well done being the main proof of ability sought by water company managers. The qualifications of skilled staff are used as a benchmark against which they are assessed when recruited and which are assumed to give them the requisite base skill and knowledge to undertake their jobs. The development of a system to enable many unskilled workers to work towards and obtain a recognised national qualification will have a significant impact in raising the profile of an often forgotten but substantial number of people in the water industry and to improve operational performance. It offers major benefits to employers and employees alike. Above all, it helps make best use of an employer's most valuable resource – its employees.

Appropriately trained and satisfied employees are major factors to create a culture of pride and effectiveness in their jobs, which in turn has a considerable effect on all quality aspects in the company.

3.2.3.2.2.6 Organisational Functions

A successful implementation and maintaining of a quality culture in a company relies a great deal on the integration of the various organisational functions within a company. In the water sector, the invoice served on a customer for water usage is a good example of such a function. A invoice for water delivered has not only the purpose of informing the customer on the amount due to the utility, but it serves the management of the utility also as an important data source for the decision making processes. Water consumption and revenue statistics of the whole company are derived from the invoicing process. Moreover, these data do not only serve as the basis for the review of the activities during the last financial year but it also helps with management planning, liquidity forecasts, financing and investments. The data retrieved from the customer accounting is also a strong stimulus for the development of water tariff policies. (Gundermann, 1994).

3.2.3.3 Total Quality Management in the Water Industry

TQM includes all aspects of the company's processes, products and services. Therefore, from what was said in the previous paragraphs, it became clear that the TQM concept is just as applicable to the water industry as to any other industry in the world. It is even more so due to the monopolistic environment where no competition exists and where the water utility must compete against itself.

The Total Quality Management concept is important to the water industry. Due to the fact that TQM results in attaining quality in products and services at competitive prices, it has a neutralising effect on the monopolistic environment in which the water industry functions.

There can be no compromises on the quality of water produced for domestic use due to health risks. The quality of water for domestic use should always comply with the highest quality standards. Quality in the water industry should therefore not be a matter of continuous

improvement of the quality of the water but rather a matter of maintaining the highest quality of potable water on a continuous basis.

Total Quality Management in the water industry has short and long term effects on a water utility. The production of sub standard water has an immediate direct effect on the consumer. If the supply of sub standard water is becoming the rule rather than the exception, customer confidence in the water utility specifically, and the water industry as a whole, will deteriorate. The only sector in the water industry that will flourish under these circumstances will be the bottled water sector. This is due to the fact that water is life and every living creature needs water to survive. The customer will use the substandard water supplied by the water utility, for washing and gardening, but for drinking purposes, bottled water will have to fill the gap. It will not be easy to restore the confidence in a water utility once its image has been damaged. Due to the fact that it operates in a monopolistic environment, the consumer does not have a variety of utilities to choose from. The circumstances force him to get his water supply from the only water utility. A TQM system will assist the utility to restore the confidence. It will provide the necessary proof that the quality of the product and the service is under control and that the supply of sub standard water is a rare exception.

The implementation of a TQM System will have a short-term financial effect on the profits of the water utilities. It costs money to implement and maintain the system. However, the confidence in the product and standard of service of the water utility created by a TQM system will in the long run bear the fruits of increased volumes of water sold and a subsequent increase in income for the utility.

The implementation of a Total Quality Management System is essential for a water utility to ensure the highest quality of water and water related services available to the public.

CHAPTER 4

QUALITY MANAGEMENT AND NAMWATER

4.1 INTRODUCTION

The Namibia Water Corporation Limited (NamWater) was officially registered as a company on 9 December 1997. The company was established in terms of the Namibia Water Corporation Act, 1997 (Act No 12 of 1997). It is a water utility operating on commercial principles, with the Government of Namibia as the sole shareholder. A Board of Directors, appointed by Government, ensures that NamWater utilises the scarce water resources of the country in the best interest of Namibia and its people. NamWater operates 190 water supply schemes throughout the country and supplies water in bulk to industry, municipalities, government departments and irrigation schemes.

According to the Namibia Water Corporation Act (Act No 12 of 1997), the objective of the Corporation is to carry out the primary business of bulk water supply to customers in sufficient quantities of a quality suitable for the customers' purposes, and by cost-effective, environmentally sound and sustainable means. In addition the Corporation should carry out secondary business of rendering water-related services, supplying facilities and granting rights to customers upon their request. The Namibia Water Corporations Act, 1997 requires that a performance contract should be concluded between the owners of the company (the State) and the Corporation. It further requires that NamWater should formulate and maintain a set of service standards in respect of the provision of water, services or facilities. It is primarily aimed at enhancing efficiency, performance, achievements, cost-effectiveness and the optimum use of resources.

There is therefore a need to develop a quality management system that will address all these aspects, to identify shortcomings within NamWater and to monitor progress on a continuous basis.

4.2 THE DEVELOPMENT OF A QUALITY MANAGEMENT SYSTEM FOR NAMWATER

As outlined by Thompson & Strickland (2003), quality management starts from the strategic plan of the company, which maps out where the organisation is heading, its short-range and long-range performance targets, and the competitive moves and internal action approaches to be used in achieving the targeted business results.

The quality management guidelines as set out by Bosman (1994) (see paragraph 2.2) are ideally suitable for the NamWater situation. According to Bosman, quality management requires vision, a quality policy, a quality standard, a quality system and the control of the system. The Bosman guidelines will be used in this study to develop a quality management system for NamWater.

4.2.1 Vision

Quality management should evolve from the strategic plan of the business and should be based on the expectations of the stakeholders which include the customers, the suppliers, the employees, the unions, and the owners, or shareholders of the company.

As the present strategic plan of NamWater is due to be updated soon, it will not be used in this study. Instead, the starting point for this study will be the stipulations as pertained in the NamWater Act of 1997, which represents the needs of the owners of the Corporation.

4.2.2 Quality policy

A quality policy is based on the vision of the company. The following requirements and guidelines were taken into consideration in setting measurable objectives for the development of a quality policy document for NamWater.

- The needs and demands of the government as the owner and sole shareholder of the company as stipulated in the NamWater Act of 1997.

- The quality objectives dealt with in the IWA and WUP programmes that were found to be compatible with the present situation in NamWater.

The proposed quality policy document for NamWater (Annexure 4) will most probably have to be updated soon to accommodate all new aspects resulting from the anticipated new strategic plan for NamWater.

4.2.3 Quality standards

As a basis for the quality system, quality standards to be used must be identified and adopted (Bosman, 1994).

Existing national or international standards are applicable to certain quality aspects in a water utility, such as the chemical and bacteriological quality of the water produced. Other quality standards in the water industry are determined by way of identifying best practice, adapt it to suit your conditions and then using it as the target or standard. This is done by making use of a metric benchmarking exercise. Some of the quality standards have to be established in consultation with the stakeholders of the Corporation.

4.2.4 Quality system

According to Bosman (1994), a quality system comprises the correct organisational structure of the company, as well as the allocation of responsibilities and authorities, and the development of procedures and processes required for implementing the quality policy. This includes determining the working methods in the company, usually in the form of a quality handbook, as well as to establish the quality items that should be recorded and reported on.

4.2.5 Quality assurance

Assessing the quality system against the chosen quality standards is of utmost importance. It is necessary to be able to show that the work is carried out in accordance with the quality system. The extend to which

the quality system meets the standards that has been set is checked by means of a structured assessment. It is also checked whether the system is applied effectively. Audit results are the basis to decide on the implementation of improvement processes (Bosman, 1994).

CHAPTER 5

A QUALITY MANAGEMENT SYSTEM FOR NAMWATER – FINDINGS AND RESULTS

5.1 INTRODUCTION

In accordance with the objectives of the NamWater Act of 1997, this chapter deals with the investigation, findings and results of quality management in NamWater. It follows the guidelines as set out in Chapter 6 of this document in the development of a quality policy and quality standards for the Namibia Water Corporation, and the compilation of a set of performance indicators to monitor the progress of NamWater regarding meeting these standards on a continuous basis. The chapter will then conclude with a proposal for a quality management system for NamWater to ensure best quality on a continuous basis to suit the needs of the customers. The development of a quality system as set out in paragraph 4.2.4 will not form part of this study.

5.2 QUALITY MANAGEMENT IN NAMWATER

5.2.1 Vision

As the strategic plan of NamWater is in the process of being updated, the point of departure used in this study was the demands of the government as the owner and sole shareholder of the company, and as set out in the Namibia Water Corporation Act of 1997. The following clauses of the Act are relevant.

- Clause 5. “The objects of the Corporation shall be to carry out efficiently, and in the best interest of the Republic of Namibia –
 - (a) The primary business of bulk water supply to customers, in sufficient quantities, of a quality suitable for the customers’ purpose, and by cost-effective, environmentally sound and sustainable means; and...”

- Clause 6. (3) “Subject tothe Minister on behalf of the State may negotiate and conclude with the Corporation, one or more performance contracts determining any or all of the following matters, namely –
 - (a)
 - (c) the expectations of the Government in respect of the Corporation’s scope of business, efficiency and financial performance;
 - (d) the financial targets which the Corporation is expected to achieve over periods of at least five years at a time, and reporting on financial matters pertaining to the Corporation;.....”

- Clause 14. (1) “The Corporation shall, subject to formulate and maintain service standards in respect of the provision of water, services or facilities or lease of its rights under this Act, and may from time to time amend those standards.

(2) In the formulation of service standards, the Corporation shall have regard to –

- (a) its duty to conserve the environment;
- (b) the requirement of its customers; and
- (c) the most cost-effective and commercially viable means of achieving the service standards and of maintaining the optimum use of resources available to the Corporation.”

The following quality aspects are a summary of all quality requirements from the NamWater Act of 1997.

- **Interruption or reduction in water supply**
 - NamWater may, after consultation with the affected customers, temporarily interrupt or reduce the supply of water to customers whenever natural intervention causes an insufficient source yield.

- NamWater may on account of a breakdown of any waterwork, or for the purpose of routine maintenance or repairs, temporarily interrupt or reduce the water supply to its customers.
- Except for an emergency situation or breakdown, NamWater shall before interrupting or reducing the supply of water, give prior written notice to the customers who will be affected not less than fourteen days when the interruption is due to insufficient source yield, and not less than five days in the case of an interruption or reduction for the purpose of carrying out routine maintenance or repairs or works of a capital nature.
- In the case of an interruption or reduction for the purpose of any maintenance or repairs or works of a capital nature, the work should be carried out within a reasonable time period.
- **Utilisation of water resources**
 - NamWater shall utilise the water resources available to it on a long-term sustainable basis.
 - NamWater shall take appropriate steps to ensure that the water resources available to it are protected from pollution caused by its operations.
- **Conservation and protection of the environment**

NamWater shall in the formulation of its policies and in the performance of its functions, take appropriate steps to conserve and protect the environment from damage, destruction or degradation, and to protect the flora and fauna, geological and physiographical features of special interest, and buildings, structures and other objects of architectural, archaeological or historic interest.
- **Preserving Public Rights**

In formulating its policies and carrying out its functions, NamWater shall have regard to the need to preserve public rights of access to mountains, forests, deserts, cliffs, foreshores or other open spaces and other places of natural beauty, and shall take appropriate steps for the preservation of such rights of access.

- **Maintaining prescribed records**

NamWater shall prepare and maintain prescribed records, which shall be available for public inspection.

- **Information to customers**

NamWater shall send to each customer at least once a year the address and telephone number of one of the offices of NamWater at which information regarding any matter included in the record maintained by NamWater may be obtained.

- **Government as a client**

The Government may enter into a written agreement with NamWater for the supply of water, services or facilities by NamWater at a cost subsidised or fully paid for by Government.

5.2.2 Quality policy (Annexure 4)

A detailed quality policy document for NamWater has been developed as part of this study (Annexure 4). This policy includes the demands of government as set out in paragraph 5.2 above. It also contains quality issues from the IWA and WUP programmes applicable to the present NamWater situation

As soon as the new strategic plan of NamWater is adopted, this quality policy should be updated to reflect any new demands from this plan.

5.2.3 Quality standards (Annexures 5 & 6)

A standard or target has been identified for each quality aspect in the proposed quality policy document for NamWater (Annexure 5). These targets have been determined by using the benchmarking exercise of WUP to identify best practice, and adapting it to suit NamWater's specific conditions.

A set of proposed service standards as prescribed by the Namibia Water Corporation Act of 1997, has been compiled for NamWater (Annexure 6). The basis for these standards was the quality requirements dealt with

in the NamWater Act of 1997 (see paragraph 5.2 above), while additional service standards as identified from the quality policy document as set out in Annexure 4, were added to the list.

5.2.4 Quality system

The development of a quality system for NamWater will form part of a separate study. It will deal with the development of a quality handbook that will comprise inter alia the structure of the organisation, agreements, responsibilities, authorities, procedures, processes, restrictions, preconditions, priorities, data bases, record keeping, and reporting required for the implementation of the quality management system.

5.2.5 Quality assurance (Annexure 5)

Various performance indicators have been identified to monitor NamWater's performance on a continuous basis over time in meeting the requirements of the quality policy and the quality standards, to ensure that the work is carried out in accordance with the quality management system, and that the quality management system is applied effectively. These indicators will also identify future performance gaps, determine various performance trends in the company, and measure and monitor the benefits of the implementation of best practice.

The following performance indicators were identified (from the IWA and WUP programmes) due to the fact that it will serve the above-mentioned purpose and that it is compatible with the present situation within NamWater. These indicators are set out in detail in Annexure 5.

Support Process

- Public health education (Annexure 2, No 17)
- Staff per million cubic meter water distributed (Annexure 2, No 23)
- Training cost (Annexure 2, No 24)
- Percentage lost days due to accidents (Annexure 2, No 25)

- Average water charges (Annexure 2, No 26)
- Rate of capital replacement (Annexure 2, No 35)
- Debt service ratio (Annexure 2, No 36)
- Current liquidity ratio (Annexure 2, No 37)
- Strategic inventory (Annexure 2, No 38)
- Personnel per main function (Annexure 3, No 1.1)
- Personnel qualification (Annexure 3, No 1.2)
- Personnel health and safety (Annexure 3, No 1.3)
- Unit total cost (Annexure 3, No 4.1)
- Internal manpower cost (Annexure 3, No 4.2)
- Annual running cost per main function (Annexure 3, No 4.4)
- Depreciation cost (Annexure 3, No 4.5)
- Energy cost (Annexure 3, No 4.3)

Sales Process

- Percentage population served (Annexure 2, No 1)
- Reduced or delayed connection charges (Annexure 2, No 5)
- Recording of customer complaints (Annexure 2, No 20)
- Customer survey (Annexure 2, No 21)
- Revenue collection efficiency (Annexure 2, No 28)
- Average debtor days (Annexure 2, No 29)
- Lifeline tariff (Annexure 2, No 32)
- Service complaints (Annexure 3, No 3.2)
- Billing complaints (Annexure 3, No 3.3)

Production Process

- Per capita consumption (domestic) (Annexure 2, No 6)
- Water conservation programmes (Annexure 2, No 7)
- Sustainability of water usage levels (Annexure 2, No 8)
- Treatment capacity utilised (Annexure 2, No 10)
- Unaccounted for water (Annexure 2, No 11)
- Recording of supply interruptions (Annexure 2, No 13)

- Water quality (Annexure 2, No 16)
- Percentage planned and unplanned maintenance (Annexure 2, No 18)
- Maintenance costs as a % of total costs (Annexure 2, No 19)
- Reservoir cleaning (Annexure 3, No 2.1)
- Valve inspection (Annexure 3, No 2.2)
- Electrical equipment inspection (Annexure 3, No 2.3)
- Vehicle availability (Annexure 3, No 2.4)
- Pump rehabilitation (Annexure 3, No 2.5)
- Pipe failures (Annexure 3, No 2.6)
- Interruptions per million cubic meters of water distributed (Annexure 3, No 3.1)

5.3 IDENTIFICATION OF PERFORMANCE GAPS WITHIN THE NAMIBIA WATER CORPORATION

According to Ramsey & Mobbs (2001), a practical starting point in identifying the present performance gaps in NamWater is to establish the key focus or performance areas in the company. After the key performance areas have been established, performance indicators must be identified for benchmarking against the performance of other water utilities in Africa as well as identified best practices in the industry. Performance gaps are those areas where the performance of NamWater does not satisfy best practice.

5.3.1 Key Performance Areas (KPA)

Larsson et al (2002) identified four key processes in a water utility. They are Support, Sales, Production and Distribution (refer to paragraph 3.2.2.3 of Chapter 3 of this document). As NamWater is not involved in distribution, only the first three key processes could serve as possible key performance areas for the company. These three processes correspond with the current activities of NamWater, as well as with the

requirements of the NamWater Act of 1997, and have therefore been identified as NamWater's key performance areas for this study.

5.3.2 Performance Gaps

NamWater is participating in two programmes for the development of performance indicators for the water supply industry: the International Water Association project on Performance Indicators for Water Supply Services, and the Water Utility Partnership for Capacity Building in Africa (WUP) programme for Performance Indicators and Benchmarking (Chapter 3, paragraphs 3.2.2.1 and 3.2.2.2).

To identify possible performance gaps within NamWater, the information from the Water Utility Partnership programme on performance indicators and benchmarking was used to evaluate the performance of NamWater against other water utilities in Africa (Annexure 2, Table 1). In general terms, the performance of NamWater is better than many water utilities in other African countries. However, by evaluating the information contained in Table 1 the following performance gaps could be identified within NamWater.

Support Process

- Public health education
- Training Cost
- Percentage lost days due to accidents
- Rate of capital replacement
- Strategic inventory

Sales Process

- Percentage population served
- Reduced or delayed connection charges
- Recording of customer complaints
- Customer survey
- Average tariff

- Revenue collection efficiency
- Average debtor days
- Lifeline tariff

Production Process

- Water conservation programmes
- Unaccounted for water
- Recording of supply interruptions

This evaluation identifies the Sales Process as being the area to concentrate on as a first priority, with the focus on the improvement of revenue collection, the improvement of customer relations and the decrease in total cost. The Support Process should be the second priority with the improvement of the asset management organisation high on the list. There are two fields in the Production Process that needs special attention. They are unaccounted-for-water, and supply interruptions.

5.3.3 Bridging of the Performance Gaps in NamWater

The identification of industry's best performers in the various fields where performance gaps exist is beyond the scope of this study. It will form part of the implementation phase of a quality management system for NamWater.

5.4 A QUALITY MANAGEMENT SYSTEM FOR NAMWATER

As can be seen from the performance gap analysis done on NamWater all three processes in the NamWater organisation have shortcomings that will have to be addressed through a quality management system. The situation is therefore ideal for the implementation of TQM for NamWater.

The quality policy developed during this study (Annexures 4 & 5) is an ideal tool for a TQM system. It describes all aspects of NamWater that

needs quality attention, performance indicators are defined to measure the progress on quality aspects and targets are set to ensure a drive for further improvement in quality. This policy can be the starting point for the development of a TQM system for NamWater.

A TQM system includes quality assurance. Targets or standards have been identified for the chosen performance indicators to monitor NamWater's performance on a continuous basis over time in meeting the requirements of the quality policy whether the work is carried out in accordance with the quality management system, and whether the quality management system is applied effectively. Annexures 5 & 6 of this document contains targets and service standards that can be used as quality assurance tools in TQM.

By introducing TQM in a company, quality assurance is automatic included, as TQM is a customer-orientated approach that fully satisfies customers' and suppliers' needs and expectations. A quality culture in an organisation will ensure a company-wide commitment to the continuous improvement of the quality of all aspects of the company.

CHAPTER 6

CONCLUSIONS

There is a need to develop a quality management system including a set of standards that will address efficiency enhancement, performance, achievements, cost-effectiveness and the optimum use of resources, to identify shortcomings within NamWater and to monitor progress on a continuous basis.

A detailed quality policy document for NamWater has been developed as part of this study (Annexure 4 & 5). This document contains various quality aspects, indicators to measure performance on these aspects, and target values to aim for in future.

Together with the quality policy document, this study also resulted in the development of a set of service standards as prescribed by the Namibia Water Corporation Act of 1997 (Annexure 5).

To identify possible performance gaps in NamWater, the information from the Water Utility Partnership programme on performance indicators and benchmarking was used to evaluate the performance of the NamWater against other water utilities in Africa. In general terms, the performance of NamWater is better than those of water utilities in many other African countries. However, a number of performance gaps were identified within NamWater. This evaluation identifies the Sales Process as being the area to concentrate on as a first priority, with the focus on the improvement of revenue collection, the improvement of customer relations and the decrease in total cost. The Support Process should be the second priority with the improvement of the asset management organisation high on the list. There are two fields in the Production Process that needs special attention. They are unaccounted-for-water, and supply interruptions.

The identification of industry's best performers in the various fields where performance gaps exist is beyond the scope of this study. It will form part of the implementation phase of a Quality Management System for NamWater.

To monitor NamWater's performance on a continuous basis over time in meeting the requirements of the quality policy, various performance indicators as set out in Annexure 5 have been identified. These indicators will also identify future performance gaps, determine various performance trends in the company, and measure and monitor the benefits of the implementation of best practice.

As can be seen from the performance gap analysis all three processes in the NamWater organisation have shortcomings that will have to be addressed through a quality management system. This situation is therefore ideal for the implementation of TQM for NamWater. The quality policy developed during this study (Annexure 4 & 5) is an ideal tool for a TQM system. It describes all aspects of NamWater that needs quality attention, performance indicators are defined to measure the progress on quality aspects and targets are set to ensure a drive for further improvement in quality. This proposed quality policy can be the starting point for the development of a TQM system for NamWater.

CHAPTER 7**RECOMMENDATIONS**

It is recommended that:

1. The quality policy as set out in Annexure 4 & 5 be adopted as the official quality policy for NamWater.
2. The set of service standards as detailed in Annexure 6 be adopted and published by notice in the Government Gazette as the official service standards of NamWater, in accordance with the Namibia Water Corporation Act of 1997.
3. The performance indicators as set out in Annexure 5 be used to monitor NamWater's performance on a continuous basis over time and also to identify future performance gaps, determine various performance trends in the company, and measure and monitor the benefits of the implementation of best practice.
4. A Total Quality Management System be implemented in NamWater to ensure the highest quality of water and water related services available to the public and that the quality policy be the starting point for the development of a TQM system for NamWater.
5. A quality system for NamWater be developed into a quality handbook that will comprise inter alia the structure of the organisation, agreements, responsibilities, authorities, procedures, processes, data bases, record keeping, and reports required for the implementation of a Total Quality Management system for NamWater.

CHAPTER 8

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ANNEXURE 1**PROCESSES AND ORGANISATIONAL FUNCTIONS IN A WATER UTILITY****1. PROCESSES IN A WATER UTILITY**

Larsson et al (2002) developed a model showing the various business processes carried out by water supply companies. The model grouped the various tasks of a water utility into four business processes namely Support, Sales, Production and Distribution.

1.1 SUPPORT PROCESS

The support process relate to strategic planning and policy development, marketing and public relations, technical planning and design, personnel management, finance and economics, information technology and processes, purchasing and materials management and general services.

1.1.1 Developing of strategic planning and policies

The development of strategic plans and policies and the determining of targets aiming at reaching the goals set out in the strategic plan. The following activities drive this process.

- Developing of a strategic plan for the water utility
- Compiling a medium to long term sales plan
- Developing production and distribution plans
- Identify limitations in the existing water supply systems
- Identify potential water sources and water conservation areas and initiate the necessary measures to protect them
- Identify new business opportunities
- Developing plans for the expansion of the business and replacement of water supply infrastructure that has reached the end of their life span (including preliminary budget figures).

- Formulation of objectives, targets and standards for the various entities in the company
- Management of the water company
- Maintaining and develop contacts with consumers, government agencies, other utility companies, institutions and organisations.
- Developing and maintaining of a water tariff policy.

1.1.2 Public Relations

Public relations activities involve the development and implementation of a public relations policy as well as the promotion of the company to the outside world.

- Policy-making and problem solving relating to public relations
- Develop and maintaining promotion activities such as newsletters, videos, advertising campaigns, press releases, social activities etc. aimed internally at the employees and externally at stakeholders and the general public
- Monitor the impact of promotion activities and new products and services
- Maintain links with the local community, press and the media
- Producing company news sheets for internal use

1.1.3 Technical planning and design

The development, monitoring and administration of medium and long-term plans related to the production and distribution of drinking water.

- Policy-making and problem solving relating to technical planning and design issues
- Identification of external aspects that may have an impact on the planning process such as demography, economy, sociology, technology, ecology and politics.
- Identification of internal aspects that may have an impact on the planning process such as strategy and technology

- Identification of various standards such as for construction and operations materials, production/distribution losses, water quality etc.
- Estimating water sales for the medium and long term and the preparation of a medium to long term sales plan
- Development of medium to long term plans for production and distribution purposes
- Identification and monitoring of catchment areas and water protection areas for the purpose of planning of protection measures
- Sufficiency analysis of existing water supply schemes
- Planning for the extension, upgrading or replacement of existing water supply schemes
- Planning of new water supply schemes
- Investigate the need and procedures for obtaining water licences or abstraction permits.

1.1.4 Economic/financial affairs

The administration of shareholder equity with the aim of increasing its economic value belongs to the finance department. Since costs, revenues and working capital are the variables that mainly influence equity value, the management thereof is the focus of this department. It involves the management of business data, the payment of creditors and the collection of money from debtors, and the optimisation of costs and revenue to marry company operations and financial results.

- Policy-making and problem solving relating to the financial/economic management process
- Administration of financial and cost accounting systems
- Budgeting and internal reporting
- Current assets and liabilities cycle (including payment and collection of debts and credits)
- Fixed assets administration (new acquisitions, depreciation, writing off etc.)

- Tax planning and tax settlement
- Preparation of financial statements and external management reports at the end of the fiscal year.
- Internal accounting services
- Treasury management
- Statistical analysis

1.1.5 Personnel administration

Personnel recruitment and personnel management with the aim to optimise the size and cost of the workforce based on corporate and strategic objectives, as well as the general well being of employees. Assist with organisational, quality, work conditions and environment issues pertaining to human resources

- Policy-making and problem solving relating to personnel recruitment and management (including social policy and training policy)
- Development and providing of personnel management services such as recruitment and selection, education and training, personnel administration, working conditions, dismissals etc.
- Development and implementing of a job evaluation and staffing policy
- Development and preparing of the corporate quality, work conditions and environmental policy and related plans
- The introduction, maintaining and assessment of the management system (service structure)
- Preparing of a annual audit plan and the co-ordination of internal audits (financial, technical, quality controls)
- Occupational health and safety

1.1.6 Information technology and processes

Management of 'Information' as the most important resource in a company involves the availability thereof in the right format where and when it is needed.

- Policy-making and problem solving relating to IT and related processes
- Maintaining and management of existing systems (hardware and software) used for data processing and storage
- Maintaining and managing local and remote systems' communication networks
- Conceptual, functional and technical design of new hardware and software
- Development and implementation of new systems

1.1.7 General services

General services are defined as all activities that are not directly involved with the production, distribution or sale of potable water.

- Policy-making and problem solving relating to the provision of general services
- Legal services
- General secretarial activities
- Housekeeping
- Management and maintenance of land and buildings
- Operation of company restaurant
- Mail processing
- Printing, archives and reproduction -
- Management of the vehicle fleet

1.1.8 Purchasing and materials management

Purchasing and materials management involves the procurement of consumables and materials needed in the water supply process.

- Policy-making and problem solving relating to the purchasing and materials management process
- Supplier selection
- Contract management
- Purchasing
- Communications with suppliers (orders, supplies)

- Monitoring stock levels
- Stock management
- Issue and consignment (including returns)

1.2 SALES PROCESS

This includes all service activities focused on the company's relationship with drinking-water consumers such as meter reading and processing of meter reading data, invoicing, debt management and debt collection, and customer relations and customer management.

1.2.1 Meter reading and processing meter reading data

This includes the reading of water meters at consumers' premises to determine the water consumption for future planning and billing purposes.

- Policy-making and problem solving relating to water meter reading and subsequent data processing
- Meter reading
- Estimation of consumption for non-metered consumers
- Meter reading data processing
- Managing and maintaining of the Customer Information System (CIS) and meter reading data base

1.2.2 Invoicing, debt management and collection

Billing of private and business consumers for water consumed or other related services, debtor management and the implementation of debt collection policies

- Policy-making and problem solving relating to invoicing, debtor management and debt collection procedures (invoicing, monitoring, collection)
- Calculation of water consumption of each individual consumer

- Calculating the amount of the water bill for each individual consumer
- Preparing and sending of water bills including debit/credit notes
- Preparing and sending of bills for other services provided by the water utility (new connections, consulting services, maintenance on privately owned water installations etc)
- Debt collection
- Reconcile payments received with registered debts
- Preparing and sending out written and/or telephone reminders
- Negotiate payment arrangements
- Initiate the disconnection of water supply to bad payers
- Writing off debts, including irrecoverable amounts
- Update customer data base with any changes
- Management and maintaining of Customer Information System (CIS)

1.2.3 Customer relations and management

Dealing with private or business customers of potable water. Customer relations management includes providing of water related advice, and carry out inspections where appropriate.

- Policy-making and problem solving relating to customer relations management
- Dealing with issues such as connection/disconnection of water supply, meter changes/repositioning, fault reports, water related advice, water education, inspections, water bill queries, information on payment schemes, complaints and other queries
- Keeping written communications with customers updated and initiate work orders where necessary
- Manage and maintain the customer relations management database and information system

1.2.4 Marketing

Marketing activities involve the development and implementation of a market policy.

- Policy-making and problem solving relating to marketing
- Monitor the impact of promotion activities and new products and services
- Expand the customer base of the company

1.3 PRODUCTION PROCESS

The production process comprises all activities relating to raw water impoundment, aquifer utilisation, water transfers, water treatment and water storage, to produce potable water in sufficient quantities and of good quality to meet the consumer demands. These processes includes the operating and maintenance of bulk water supply facilities, construction of bulk water supply infrastructure, management of catchment areas and water protection areas, water resource management, and water quality monitoring, sampling and analysis.

1.3.1 Operating of bulk water supply facilities

This includes all activities needed on a continuous basis to operate the entire production cycle from the raw water impoundment to the bulk reservoirs for potable water. It includes the following activities:

- Policy-making and problem solving relating to the operation of bulk water supply facilities
- Operation and management of water treatment plants and pump stations
- Operation and management of dams, pipelines, tanks and reservoirs
- Operation and management of borehole schemes
- Recording of all operational data – data processing and management of a operations information system

1.3.2 Maintaining of bulk water supply facilities

This includes preventive (scheduled) maintenance and breakdown maintenance on bulk water supply infrastructure.

- Policy-making and problem solving relating to the maintenance of bulk water supply infrastructure
- Compiling preventative maintenance schedules
- Plan all maintenance activities
- Recording of all maintenance data – data processing and management of maintenance information systems
- Execution of all maintenance work on all water supply infrastructure
- Carrying out of maintenance inspections on all water supply infrastructure

1.3.3 Construction of bulk water supply infrastructure

This includes own construction activities as well as construction work done by contractors.

- Policy-making and problem solving relating to construction activities for the creation of new water supply infrastructure or for the renovation and upgrading of existing water supply infrastructure
- Plan all construction activities
- Budget compilation, payments and financial control
- Supervision and quality control on construction sites
- Contract administration
- Management of construction sites
- Commissioning of new plants, networks and equipment

1.3.4 Managing of catchment areas and water protection areas

Policy development for the management of catchment areas and water protection areas. Protecting and improving the conditions in the catchment areas and water protection areas. This is being done by means

of environmental management programs and water conservation programs. It includes the following activities.

- Policy-making and problem solving relating to catchment areas and water protection areas
- Development of management plans for catchment areas and water protection areas
- Manage, protect and improve the conditions in the catchment areas and water protection areas
- Planning and implementing of environmental conservation programs

1.3.5 Water resource management

- Policy development for the purpose of maintaining and improving the quality of water resources.
- Development of management plans for the protection of the water resources
- Maintaining and improving the quality of water resources (surface water and groundwater)

1.3.6 Water quality monitoring, sampling and analysis

It involves the monitoring of the quality of the raw and product water on a continuous basis.

- Policy-making and problem solving relating to water quality monitoring
- Operating of a biological and chemical laboratory to constantly verify the quality of the water
- Schedule the sampling of water in the field
- Compare results with prescribed water quality standards
- Compile reports on water quality
- Advice on production processes and issue guidelines in this regard
- Monitor the quality of water in catchment areas and water protection areas

- Recording of all water quality data – data processing and management of a water quality information system

1.4 DISTRIBUTION PROCESSES

This includes all service activities aimed at guaranteeing an uninterrupted supply of water in sufficient quantities and of a good and consistent quality, to individual small consumers. The (re)installing, replacement and maintenance of water meters is considered to form part of the distribution process, but meter reading does not. It mainly consists of the operating and maintaining of water distribution systems.

1.4.1 Operating water distribution systems

- Policy-making and problem solving relating to the operation of water distribution systems to individual small consumers
- Operation and management of pump stations
- Operation and management of pipelines, tanks and reservoirs
- Recording of all operational data – data processing and management of a operations information system
- Carrying out of operations inspections on the water distribution system

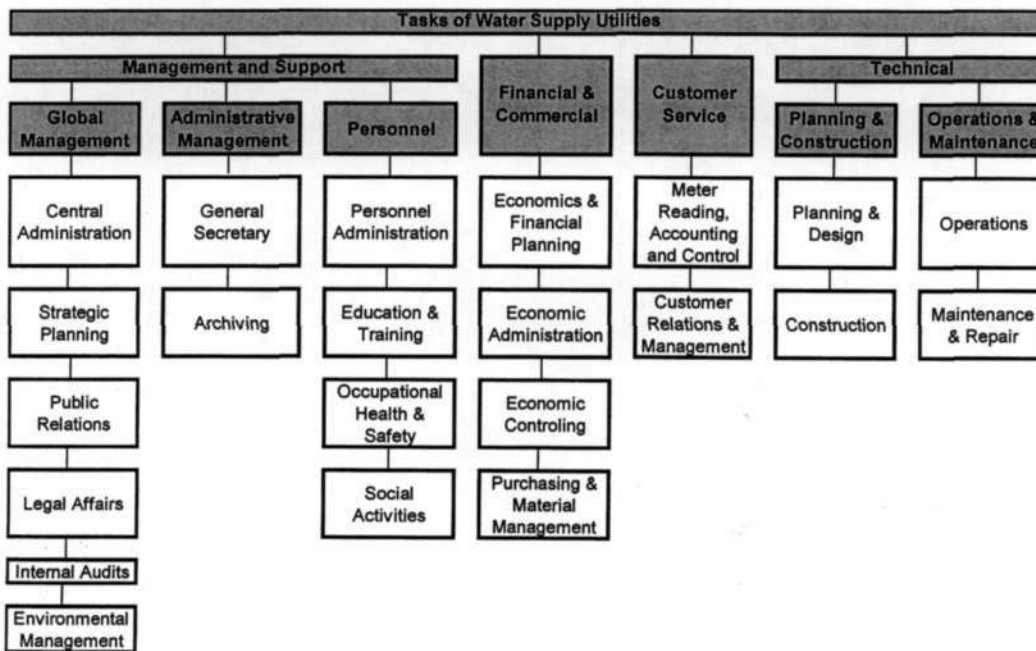
1.4.2 Maintaining of water distribution systems

- Policy-making and problem solving relating to the maintenance of water distribution systems to individual small consumers
- Compiling preventative maintenance schedules
- Plan all maintenance activities
- Recording of all maintenance data – data processing and management of maintenance information systems
- Execution of all maintenance work on the water distribution system
- Cleaning, overhauling and calibration of water meters

- Carrying out of maintenance inspections on the water distribution systems
- Prepare and execute plans for the upgrading, replacement or small extensions to the water distribution system

2. ORGANISATION FUNCTIONS IN A WATER UTILITY

Alegre et al (2000) grouped the various tasks necessary to carry out the four business processes in a water utility, into seven functions. These functions are further grouped into four main organisational functions as set out in detail in this section and summarised in the table below.



2.1 Global Management

- Central Administration
 - Strategic policies
 - External relationships
 - New business
 - General secretariat

- **Strategic Planning**
 - Objectives definition
 - Organisation
 - Information systems planning
 - Performance assessment
- **Public Relations**
 - Press service and releases
 - Communication and image
 - Customer surveys
 - Public awareness campaigns
 - Marketing
 - Publications and information
 - Company reports
- **Legal Affairs**
 - Legal contracts
 - Tender documentation
 - Legal protection and insurance
 - Land administration
 - Contentious matters and litigation
- **Internal Audits**
 - Check of financial procedures
 - Check of administration procedures
 - Check of technical procedures
 - Quality controls
- **Environmental Management**
 - Environmental policies
 - Environmental management and audits
 - Control of waste management

2.2 Administrative Management

- **General Secretary**
 - Document registration
 - Internal administrative circulars registration

- Word processing and copying services
- Archiving
 - Archive management
 - Library management

2.3 Personnel

- Personnel Administration
 - Personnel planning and development
 - Recruitment
 - Personnel management
 - Job evaluation
 - Payroll accounting and payment
- Education and Training
 - Training planning
 - Training implementation and control
 - Dissemination of technical information
- Occupational Health and Safety
 - Medical checks
 - Evaluation of unfitness for work
 - Workplace safety policies, implementation and control
- Social Activities
 - Integration of new personnel
 - Social assistance
 - Socio-cultural activities

2.4 Financial and Commercial

- Economic and Financial Planning
 - Investment planning and control
 - Cost planning and control
 - Revenue and cost recovery planning
 - Financial planning and policies
- Financial Administration
 - Book keeping

- Tangible assets assessment
- Annual accounts reporting
- Economic Control
 - Planning control
 - Accounting control
 - Economic performance assessment
- Purchasing and Material Management
 - Suppliers information management
 - Advertisement
 - Commissioning
 - Stock management

2.5 Customer Service

- Meter Reading, Accounting and Control
 - Meter reading
 - Accounting
 - Debt Collection control
 - Consumption control
- Customer Relations and Management
 - Incoming order management
 - Customer consultation
 - Complaint management
 - Information dissemination to the Customers

2.6 Planning and Construction

- Planning and Design
 - Resource management and water protection
 - Water supply master plan with medium and long term demand and supply and technical objectives
 - Asset management planning, rehabilitation programmes
 - Planning and design of plants, networks and equipment
 - Specification of plants, construction and materials selection

- Planning and design of technologies
- Procurement of consulting services
- Statistics
- Construction
 - Procurement of construction works by external contract
 - Direction of works undertaken by direct labour
 - Supervision, quality control and acceptance
 - Commissioning of new plants, networks and equipment
 - Payments and financial control

2.7 Operations and Maintenance

- Operations
 - Supervision of source protection areas
 - General system monitoring and control
 - Standby duties and risk management
 - Documentation, data collection, record keeping and data processing
 - Water quality monitoring, sampling and analysis
 - Water loss management
 - Operational acceptance of new plants, networks and equipment
 - Re-commissioning of systems after shut down
- Maintenance and Repair
 - System inspection
 - Regular maintenance checks or service activities
 - Repairs of failures and other defects
 - Cleaning
 - Refurbishment
 - Regular meter replacement and maintenance
 - Maintenance and repair of fire fighting assets

3. SUMMARY OF PROCESSES AND ORGANISATIONAL FUNCTIONS OF A WATER SUPPLY UTILITY

Processes in Water Supply Utilities	Organisational functions of a Water Supply Utility						
	Management and Support			Financial and Commercial	Customer Service	Planning and Construction	Technical
	Global Management	Administrative Management	Personnel				
	Tasks of a Water Supply Utility						
Support	Central administration	General Secretary	Personnel Administration	Economic and financial planning		Planning and design	
	Strategic planning and policies	Archiving	Education and training	Financial administration			
	Public relations		Recruitment	Economic control			
	Legal affairs		Occupational health and safety	Purchasing and material management			
	Internal audits		Social activities				
	IT and automation						
Sales					Meter reading and processing		
					Invoicing, collection and debt management		
					Customer relations and management		
					Marketing		
Production	Environmental Management					Construction	Operations
						Resource management	Maintenance and repair
						Water conservation programs	Water quality monitoring
Distribution							Operations
							Maintenance and repair

ANNEXURE 2

PERFORMANCE INDICATORS AND BENCHMARKING PROGRAMME OF THE WATER UTILITY PARTNERSHIP (WUP)

The Water Utility Partnership (WUP) project on Performance Indicators and Benchmarking culminated in a database on various performance indicators in the water sector from 110 African water utilities (including NamWater). Table 1 presents a summary of the benchmarking exercise to compare the performance of NamWater with other water utilities in Africa.

The following performance indicators were used in the WUP project (Ramsey & Mobbs, 2001).

1. Percentage population served

The indicator is calculated as

$$[(\text{Total number of persons served}) / (\text{Total number of persons in area of operations})] * 100$$

This indicator represents a measure of the service coverage of the utility. The greater the service coverage, the greater is the utility's service to the local community in providing water supply. The indicator measures extent of service but does not measure quality of service.

Utilities should aim for at least 90% service coverage, but clearly the higher the service coverage, the better.

NamWater is presently at about 60% service coverage taken into consideration that the area of operations is the entire country. To increase this coverage will require an aggressive marketing campaign that will involve the support process of marketing and public relations within NamWater.

2. Tankered or other supply services to the population not directly covered

This is a Yes/No indicator. It represents a measure of the service coverage of the utility. Utilities which have a significant population which is not directly served should aim to provide at least a tankered service to such people.

The provision of water by way of a tanker service is very expensive and totally uneconomical. Such a service normally serves the poorest people in the community. As NamWater is operated on a full cost recovery basis, it could only supply such a service if it is subsidised by government.

3. Percentage increase in domestic connections over the year

This indicator is calculated as:

$$\frac{[(\text{Number of new domestic connections during last year}) / (\text{Number of domestic connections at start of year})] * 100}{}$$

This indicator represents a measure of the rate of expansion of the system. Where utilities have a poor existing service coverage, this indicator will pick up the degree to which the utility is addressing this issue.

For utilities with already high service coverage, it is expected that this indicator will be low since the only expansion opportunities will be through growth in population.

As NamWater is a bulk water supplier, the number of domestic connections is not a realistic indicator to measure the rate of expansion of the NamWater supply system.

4. Percentage increase in new standpipes over the year

This indicator is calculated as:

$$\frac{[(\text{Number of new standpipe connections during last year}) / (\text{Number of standpipe connections at start of year})] * 100}{}$$

This indicator represents a measure of the rate of expansion of the system. Where utilities have a poor existing service coverage, this indicator will pick up the degree to which the utility is addressing this issue.

For utilities with already high service coverage, it is expected that this indicator will be low since the only expansion opportunities will be through growth in population.

As NamWater is a bulk water supplier, the number of standpipes is not a realistic indicator to measure the rate of expansion of the NamWater supply system.

5. Reduced or delayed connection charges to low income households

This is a Yes/No indicator. It represents a measure of an aspect of customer service by the utility. Utilities which provide reduced or delayed connection charges to low income households take seriously the need for system expansion in the community and, moreover, are prepared to offer incentives to poorer members of the community to connect to the network. This indicator does not assess the extend or effectiveness of the policy of reduced or delayed connection charges to low-income households.

The payment for connection charges is the same for all NamWater customers. A large section of the community served by NamWater is poor and cannot afford to pay connection charges. The implementation of a system of reduced or delayed connection charges to low-income households, would offer incentives for every member of the community

to connect to the system. It could be part of the social responsibility of NamWater as well as the expansion of the existing service coverage. Umgeni Water in South Africa is identified as a benchmark for this indicator.

6. Per capita consumption (domestic)

This indicator is calculated as:

$$\frac{(\text{Total annual domestic consumption in litres})}{(\text{Number of domestic connections at year end})} \div \frac{(\text{Average number of persons per connection})}{365}$$

The units of this indicator are litres per capita (head) per day (l/c/d).

This indicator represents the average daily consumption per person. Utilities should be aiming for a middle ground here – customers should have enough water available to support daily needs but demand should not be so high as to be wasteful, damage the environment or be unsustainable in the long term. The per capita consumption measure is particularly useful when viewed over a number of years so that trends in customer use can be tracked. Excessive per capita consumption can lead to resource constraints and capital demand for additional capacity.

In the United Kingdom, the average per capita consumption is around 150 litres per head per day. It could therefore be reasoned that a figure of over 200 l/c/d represents excessive usage.

The present average NamWater figure of 120 l/c/d seems to be reasonable. This indicator should however be monitored on an annual basis as a total average as well as per individual water supply scheme to identify the problem areas and to monitor progress in the long run.

7. Water conservation programme

This indicator is a Yes/No indicator. It shows whether or not a utility has a water conservation or water use reduction programme or policy. Implementation of effective water conservation or water use reduction plans can lead to significant benefits related to the delay in large capital expenses. However, it is not a general acceptable economic principle to promote the reduction in the use of the product you are selling. This indicator does not assess the extent or effectiveness of water conservation or water use reduction plans.

NamWater actively drives conservation programmes only during periods of severe drought. A balance should be found between the conservation of water and the income from water sales. The solution is most probably in the implementation of a system whereby water is being treated as an economic commodity. The availability and cost of water should depend on the economic value of the water where it is being used in industry.

8. Sustainability of water usage levels

This is a Yes/No indicator. It shows whether or not a utility believes that current water usage levels are sustainable into the future. This assessment may be based on formal assessments of resource availability and conservation, or it may be the utility's own view as to whether water can continue to be abstracted at the present rate without depleting resources.

All water resources operated by NamWater, is managed on a sustainable manner. However, new sources will have to be developed to sustain the water usage levels, especially during periods of severe drought.

9. Sufficiency of water resources

This is a Yes/No indicator. It shows whether or not a utility believes that existing water resources are sufficient to meet future (10 years) demand. This assessment may be based on formal assessments of resource availability and conservation, or it may be the utility's own view as to

whether existing water resources can meet demand 10 years into the future.

NamWater does its sufficiency analysis for all its schemes on an annual basis. Sufficiency is based on a five-year horizon.

10. Percentage treatment capacity utilised

This indicator is calculated as:

$$[(\text{Average daily volume of water treated in m}^3/\text{day}) / (\text{Total design capacity of all treatment works in m}^3/\text{day})] * 100$$

This indicator is intended to identify the level of spare capacity within the system based on current demand, to identify capacity constraints and where such constraints might be anticipated in the future based on demand growth pressures. If this indicator is above 90%, it indicates that the supply/demand balance is critical and that water conservation, leakage reduction and treatment capacity extension are measures which should be considered to address the potential shortfall.

On average this figure is between 60 and 70 percent for treatment plants operated by NamWater. However, for this figure to be more useful, the indicator should be applied to each and every treatment plant individually.

11. Percentage unaccounted for water

This indicator is calculated as:

$$[\{(\text{Volume of water distributed in year in m}^3) - (\text{Legitimate consumption in year in m}^3)\} / (\text{Volume of water distributed in year in m}^3)] * 100$$

This indicator is a measure of leakage and other system losses. For every system there is an economic level of leakage, that is, an optimum level

of leakage for that system. This is derived from a balance between resource availability and demand, and cost of water, offset by the progressive cost of leakage reduction, such that in every system there is a point of acceptable leakage. This indicator does not address economic levels of leakage, it merely compares the relative levels of unaccounted for water.

It is difficult to recommend a target value for unaccounted for water. As said above, each utility will have its own optimum value, dependent upon the water resources position, cost of water, cost of leakage control and system characteristics such as density of connections and age of infrastructure. In the United Kingdom, almost all utilities lie in the range of 10 to 20 percent with the utilities in the drier regions towards the 10% mark and the wetter areas mostly near the 20% mark.

The unaccounted for water figure for NamWater is at present in the order of 20%. Due to the fact that the presently installed production water meters are not that reliable, this indicator cannot be measured with a high degree of accuracy. The cost to correct the production water meter installations should be weighed against the cost of the water losses due to leakages in the system.

12. Availability of piped water supply (hours per day)

This indicator is a measure of the availability of water supply. It is measured in terms of the average number of hours each day when a normal supply is provided.

The benchmark for this measure should be that piped water supply is available 24 hours a day on average.

NamWater is a bulk water supplier and mainly supply water in a terminal reservoir, from where it is distributed by others. Water is available in the terminal reservoirs on a 24-hour basis, except in extraordinary conditions such as system failures or flood damages.

13. Recording of interruptions to supply (affect of failures on customers)

This is a Yes/No indicator. It identifies whether or not utilities routinely record plant and infrastructure failures which affect customers. Utilities which record such failures are in a better position to effectively manage the assets under their control and have the information available to make decisions regarding any required remedial action.

All maintenance work (scheduled and unplanned) on NamWater infrastructure is being recorded on the SAP system. This is an indication of infrastructure failures experienced. However, the system does not link these recorded failures to the affect it had on the customer.

14. Routine monitoring of raw water quality

This is a Yes/No indicator. It identifies whether or not utilities routinely monitor raw water quality at main water sources. Utilities which routinely monitor raw water quality will have advanced warning of water quality problems and can prevent adverse public health incidents.

The water quality at all supply systems operated by NamWater is being monitored on a regular basis.

15. Routine monitoring of water quality in distribution

This is a Yes/No indicator. It identifies whether or not utilities routinely monitor water quality at various places in the distribution system. Utilities which routinely monitor water quality in distribution systems will be able to detect whether the water is up to the required quality to be supplied to its customers and is not reliant on customer feedback which may be too late to prevent widespread contamination.

Being a bulk water supplier, NamWater do not measure water quality in distribution systems other than its bulk water distribution system.

16. Percentage samples failing to meet quality standards

This indicator is a measure of the quality of water delivered to customers.

It is difficult to recommend a benchmark for this indicator since the target should be 0%, although this may not be achievable in practice. There are also issues which cloud the picture such as varying local standards and the fact that a failure on one parameter (such as faecal coliforms) may be more serious than 100 failures on another parameter (such as colour or taste).

It is particularly important for this indicator to track performance over time. Improving water quality levels should be the aim of all utilities that have not yet achieved perfection. Where investments have been made to improve the quality of the water, the effectiveness of these investments should be measured over time.

In NamWater these failures are in the order of 5% on average. This is an indicator that should be implemented on an individual water scheme level.

17. Public health education

This is a Yes/No indicator. It identifies whether or not utilities actively promote public health education. It is important that the public are aware of the dangers of waterborne diseases and know how to minimise the risk of contracting these diseases.

NamWater is not actively involved in any campaign regarding public health education. It is at present being seen as a function for the Ministry of Health and Social Services in Namibia.

18. Percentage planned and unplanned maintenance

This indicator is calculated as the percentage split between planned and unplanned maintenance, based on the planned and unplanned

maintenance costs reported for the year. Planned maintenance cost is defined as all costs associated with maintenance programmes and normal maintenance routines; basically all scheduled maintenance. Unplanned maintenance cost is defined as all maintenance expenditure associated with emergency repairs, breakdowns and all non-planned maintenance.

This indicator is a measure of the degree to which the utilities' assets are being pro-actively managed. It is a leading indicator of the level of service to customers, i.e. poor performance in this indicator means that if sustained over a period of time, assets will deteriorate leading to reduced service levels to customers.

It is for each utility to determine its own optimal level of maintenance since too little maintenance leads to deteriorating asset condition and service levels whilst too much maintenance is clearly prohibitively expensive.

It is particular important for this indicator to track performance over time and to identify trends. NamWater should also determine the level of this indicator as applicable to their situation.

19. Maintenance costs as a % of total costs

This indicator is calculated as:

$$[(\text{Total maintenance cost}) / (\text{Total operating and maintenance costs})] * 100$$

This indicator is a measure of the relative level of maintenance costs in comparison with total operating costs. The optimum level of maintenance depends on many factors, mostly specific to each utility, and cannot be determined as an absolute value.

It is particularly important for this indicator to track performance over time and to identify trends. NamWater should also determine the level of this indicator applicable to their situation.

20. Recording of customer complaints

This is a Yes/No indicator. It identifies whether or not utilities routinely maintain a record of customer complaints received. A utility that maintains such a record is able to respond to customer needs and can demonstrate that it takes customer service seriously. The indicator does not provide any information about the extent or depth of the information recorded nor any actions resulting from the complaint.

The recording of customer complaints is a low-key operation at NamWater at the moment.

21. Customer surveys

This is a Yes/No indicator. It identifies whether or not utilities conduct surveys to identify customer needs and demands. A utility that undertakes such surveys can demonstrate that it takes seriously the views and requirements of its customers. The indicator does not provide any information about the content or scope of the customer surveys nor any information about how the surveys are used in decision-making.

One customer survey was conducted since the establishment of NamWater in 1998. Unfortunately nothing came forth from it mainly due to a lack of initiative from NamWater.

22. Staff per 1000 connections

This indicator is calculated as:

$$\left[\frac{\text{Total number of staff}}{\text{Total number of connections at year end}} \right] * 1\ 000$$

It is a measure of overall staffing levels. Utilities with lower ratios can be considered to be more efficient but, equally, a utility should not be under-staffed such that public health and the environment are put at risk.

This indicator is not applicable to NamWater as a bulk water supplier.

23. Staff per million cubic meters water distributed

This indicator is calculated as:

$$[(\text{Total number of staff}) / (\text{Volume of water distributed in the year in m}^3)] * 1\,000\,000$$

It is a measure of overall staffing levels. Utilities with lower ratios can be considered to be more efficient but, equally, a utility should not be under-staffed such that public health and the environment are put at risk. Small utilities may lack the critical mass and economies of scale of larger organisations and may therefore appear relatively over-staffed.

The NamWater figure for this indicator is at the moment in the order of 12, which compares favourable with other utilities in Africa which are between 20 and 30 on average.

24. Training cost as a % of total payroll

This indicator is calculated as:

$$[(\text{Total training costs in year}) / (\text{Total payroll in year})] * 100$$

It is a measure of the level of training undertaken by a utility. Properly trained and skilled staff are essential for the prudent running of a water utility and under-investment in training can lead to public health, environmental and health and safety problems.

The training budget of NamWater is about 0,1% of its payroll compared to less than 2% for Africa water utilities on average.

25. Percentage lost days due to accidents

This indicator is calculated as:

$$[(\text{Total days lost due to accidents in year}) / (\text{Total days worked in year})] * 100$$

It is a measure of health and safety record of the utility. Utilities should be aiming for a low accident rate and this can be achieved through proper training and supervision. Against an ultimate target of zero, anything over a few percent appears excessive.

NamWater does not have accurate figures to calculate this indicator.

26. Average tariff (US\$ per cubic meter)

This indicator is calculated as:

$$(\text{Total direct tariff revenue in year in US\$}) / (\text{Total legitimate consumption in year in m}^3)$$

This indicator measures the notional average tariff of the utility. The direct tariff revenue for the reporting year is the actual amount billed for water services.

For the United Kingdom water utilities, the notional average tariffs lie mostly in the range of 0,7 to 1,3, which is at the most expensive end of the spectrum when compared with the African utilities.

The average water tariff calculated for NamWater of 0,22 is at the lower end of the spectrum compared to the rest of Africa, which varies from almost zero to 1,5.

27. Tariff cost recovery

This indicator is calculated as:

$$[(\text{Total direct tariff revenue in year}) / (\text{Total operating and maintenance costs in year})] * 100$$

This indicator measures the tariff cost recovery of the utility. This is a key measure of a utility's ability to cover its operating and maintenance costs (excluding interest and depreciation) from revenues, without reliance on external subsidies, and is generally perceived as an indication of a commercial approach to the provision of a public service. The aim is for utilities to score at least 100, which indicates that tariff revenues are just enough to cover operating and maintenance costs.

For the United Kingdom utilities, the tariff cost recovery values lie mostly in the range of 150 to 250, which is at the higher end of the scale when compared with African water utilities.

In accordance with legislation, NamWater operates on a full cost recovery basis.

28. Revenue collection efficiency

This indicator is calculated as:

$$[(\text{Total revenue collected in year}) / (\text{Total direct tariff revenue in year})] * 100$$

This indicator measures the revenue collection efficiency of the utility. This shows how much revenue has been collected compared to how much has been billed in the reporting year. It is in the utility's interests that the revenue collection efficiency should be maximised. It is possible to score greater than 100 for this indicator since revenue left uncollected from last year may be collected this year and added to the billed revenue

this year. It should be the aim of utilities to score as near to 100% as possible over a sustained period of time.

The NamWater figure for revenue collection efficiency is currently in the order of 80%, which is in the upper half of the achievements by other Africa water utilities. Debt collection should receive more attention in NamWater.

29. Average debtors days

This indicator is calculated as:

$$\left[\frac{\text{Accounts receivable at year end}}{\text{Total direct tariff revenue in year}} \right] * 365$$

This indicator is a measure of the outstanding customer debt at year-end. It is measured in terms of the number of days' worth of billings outstanding. It is in utility's interest to minimise this number.

The NamWater figure for average debtors days is at the moment in the order of 120 days, compared to 33% of Africa water utilities that have figures of more than 365 days. Debt collection should receive more attention in NamWater.

30. Percentage of customers metered

This indicator is a measure of the level of metered supply across all customers. Metered supply can help to produce accurate estimates of usage as well as provide an inducement to customers to conserve water.

All NamWater customers are metered.

31. Percentage of meters checked, recalibrated or replaced

This indicator is a measure of the level of accuracy of meters since meters which have been checked, recalibrated or replaced will be more accurate than meters which have not.

On average 20% of NamWater's water meters are recalibrated or replaced every year. All the water meters are checked on a monthly basis.

32. Lifeline tariffs

This is a Yes/No indicator. Life line tariffs are low, or free of charge, or tariffs for a particular level of water usage, usually judged as sufficient for basic living, and can be used to ensure that the poor can afford the bare minimum amount of water. This indicator does not provide any details about such tariffs, e.g. what the minimum amount of water is or what charges are made for this water.

NamWater does not charge a lifeline tariff. All subsidy needs for the poor people of the country, come from the government's budget. The present tariff policy should be revised to address lifeline tariffs as well as the economic value of water.

33. Percentage revenue subsidy

This indicator is calculated as:

$$[(\text{Revenue subsidy received in year}) / (\text{Total direct tariff revenue in year})] * 100$$

In most countries, revenue subsidies are in decline and are not perceived to be a sustainable basis for operation of the utility. Subsidies such as fuel subsidy, import duty subsidy, tax subsidies, capital subsidies, etc. are not included in the revenue subsidy.

This indicator is not applicable to NamWater as the company operates on a full cost recovery basis.

34. Depreciation policy

This is a Yes/No indicator. It identifies those utilities which operate a depreciation policy. This is a formal accounting system which charges

the cost of asset ownership to its operations, i.e. the value of assets is written off as their useful life decreases. This is a prudent accounting policy to adopt. This indicator does not provide any details about the depreciation policy such as asset lives assumes for different types of asset.

NamWater do operate a depreciation policy.

35. Rate of capital replacement (% per year)

This indicator is calculated as:

$$[(\text{Number of pumps replaced in year}) / (\text{Total number of pumps at year end})] * 100$$

Capital assets may often last a long time but they do not last forever. Every utility needs not only to expand and develop its assets to meet new operating demands, but also to replace assets as they wear out. The rate at which assets wear out will depend on how they have been maintained, and for every asset there is an optimal replacement time. As a readily available proxy measure of the overall rate of capital replacement, one element of capital assets has been taken – the rate of pump replacement. Abstraction, transmission and delivery pumps are included in the measure but sump pumps, dewatering pumps, chemical dosing pumps, sludge pumps, etc. have been excluded. The rate of pump replacement of say 20% relates to an asset live of 5 years while a replacement rate of say 2% relates to an asset live of 50 years.

The necessary figures are not readily available to calculate the rate of capital replacement for the NamWater situation.

36. Debt service ratio

This indicator is calculated as:

$$\frac{[(\text{Total annual debt service}) / (\text{Total direct tariff revenue in year})]}{100}$$

This indicator is a measure of a utility's ability to meet its debt service obligations from revenue earned. Revenue will not cover debt service obligations if the score exceeds 100. Annual debt service is the total amount of interest and principal paid during the reporting year in respect of both long term and short-term borrowings and overdrafts. This includes interest and principal which has been capitalised.

The NamWater figure for debt service ratio is in the order of 50.

37. Current liquidity ratio

This indicator is calculated as:

$$\frac{[(\text{Total current assets}) / (\text{Total current liabilities})]}{100}$$

This indicator is the current liquidity ratio, which measures a utility's ability to meet its current liabilities from its current assets, i.e. whether there are enough resources at hand to meet present financial commitments. Current assets include cash, stock, debtors and other short-term assets. Current liabilities include overdrafts, short-term borrowings, money owed to suppliers (creditors) and any other short term liabilities. Utilities with scores under 100 have more liabilities than assets and are financially over-committed.

The NamWater figure for the current liquidity ratio is at present 175 which is an indication that the company can still meet its present financial commitments.

38. Strategic inventory

This is a Yes/No indicator. It identifies those utilities which categorise inventory as strategic and non-strategic. Strategic inventory is that which is essential to the operation of the business, for example key spares, which would not otherwise be readily available. This indicator does not provide any information about which types of inventory are categorised as strategic or non-strategic, nor what the inventory policies actually are.

NamWater does not have an official strategic policy regarding inventory.

Table 1. Benchmarking of NamWater against other water utilities in Africa

Process/ KPA	Performance Indicator				Comments
	No	Indicator	Africa	NamWater	
Support	17	Public Health Education	18% Yes	No	Ministry of Health & Social Services
	22	Staff per 1000 connections	5 to 120	Not applicable	Bulk water supplier
	23	Staff per million cubic meters water distributed	10 to 230	12	
	24	Training cost	0% to 24%	0,1%	>10% is excessive
	25	Percentage lost days due to accidents	5% to 20%	Not measured	To be explored
	33	Revenue subsidy	0% to 135%	Not applicable	Full cost recovery
	34	Depreciation	19% Yes	Yes	
	35	Rate of capital replacement	2% to 20%	No figure available	To be explored
	36	Debt service ratio	5% to 205%	50%	Should be <100
	37	Current liquidity ratio	10% to 15221%	175%	Should be >100
38	Strategic inventory	11% Yes	No figure available	To be explored	

Process/ KPA	Performance Indicator				Comments
	No	Indicator	Africa	NamWater	
Sales	1	Percentage population served	5% to 100%	60%	To be explored
	3	Increase in connections	1% to 25%	Not applicable	Bulk water supplier
	4	Increase in standpipes	0% to 60%	Not applicable	Bulk water supplier
	5	Reduced or delayed connection charges	6% Yes	No	To be explored
	20	Customer complaints	73% Yes	No	Low-key operation at Nam Water
	21	Customer survey	10% Yes	No	One survey in 6 years
	26	Average tariff	0 to 1,5 US\$/m ³	0,22 US\$/m ³	0,7 to 1,3 US\$/m ³ in the UK
	27	Tariff cost recovery	0% to 400%	100%	150% to 250% in the UK
	28	Revenue collection efficiency	0% to 166%	80%	Should be >100%
	29	Average debtors days	40 to 810 days	120 days	
	30	Customers metered	1% to 100%	100%	
	32	Lifeline tariffs	47% Yes	No	Poor people subsidised by Government

Process/ KPA	Performance Indicator				Comments
	No	Indicator	Africa	NamWater	
Production	2	Tankered Service	39% Yes	No	Social function of Government
	6	Per capita consumption (domestic)	10 to 370 l/c/d	120 l/c/d	>200l/c/d is excessive use
	7	Water conservation programmes	46% Yes	Yes & No	Only during draught periods
	8	Sustainability of water usage levels	10% Yes	Yes	Need for new sources
	9	Sufficiency of water resources	11% Yes	Yes & No	More than one water supply scheme
	10	Treatment capacity utilised	35% to 100%	50% to 60%	Average figure for all plants
	11	Unaccounted for water	3% to 72%	20%	Production water meters not accurate
	12	Piped water supply	2h to 24 h	24 h/day	Bulk supply
	13	Recording of supply interruptions	15% Yes	Not measured	To be explored
	14	Routine monitoring of raw water quality	66% Yes	Yes	
	15	Routine monitoring of product water quality	61% Yes	Yes	
	16	Samples failing to meet quality standards	1% to 40%	5%	
	18	Planned and unplanned maintenance	0% to 100%	25% planned	
	19	Maintenance cost as a % of total cost	1% to 11%	8%	
	31	Meters checked, recalibrated or replaced	0% to 100%	20%	100% of the meters is checked

ANNEXURE 3

PERFORMANCE INDICATORS FROM THE IWA PROGRAMME

(Alegre et al, 2000)

The following performance indicators from the IWA programme (see Chapter 3, paragraph 2.2.1) were not selected for the WUP programme. However, it has been identified as applicable to the NamWater situation and will be used in this regard. Unfortunately, it cannot be used in the benchmarking process as developed by WUP.

1. PERSONNEL INDICATORS

1.1 Personnel per main function of the utility (Management and Support, Financial and Commercial, Customer Services, Technical)

[Number of full time employees dedicated to a main function / Volume of water distributed in a year in cubic meters] * 1 000 000

1.2 Personnel qualification

[Number of employees with a tertiary qualification / Total number of full time employees] * 100

1.3 Personnel health and safety

Absenteeism

Total number of days absent during the year / Total number of full time employees

2. OPERATIONAL INDICATORS

2.1 Reservoir cleaning

[Volume of reservoirs cleaned during the past year / Total volume of reservoirs] * 100

2.2 Valve inspections

[Number of valves inspected during the year / Total number of valves] * 100

2.3 Electrical equipment inspection

[Number of electrical installations inspected during the year / Total number of electrical installations] * 100

2.4 Vehicle availability

[Number of vehicles daily available on average / Volume of water distributed in a year in cubic meters] * 1 000 000

2.5 Pump rehabilitation

[Total nominal power of pumps subject to repair and replacement during the year / Total nominal power of pumps] * 100

2.6 Pipe failures

[Number of pipe failures (including valves and fittings) during the year / Total length of pipelines] * 100

3. QUALITY OF SERVICE INDICATORS**3.1 Interruptions per million cubic meters of water distributed**

[Total number of interruptions / Volume of water distributed in a year in cubic meters] * 1 000 000

3.2 Service complaints

[Number of complaints of quality of service during the year / Volume of water distributed in a year in cubic meters] * 1 000 000

3.3 Billing complaints

Number of billing complaints during the year / Number of registered customers

4. FINANCIAL INDICATORS**4.1 Unit total cost**

(Annual running cost + annual capital cost) / Volume of water distributed in a year in cubic meters

4.2 Internal manpower cost

[Annual internal manpower cost / annual running cost] * 100

4.3 Energy cost

[Annual energy cost / Annual running cost] * 100

4.4 Annual running cost per main function of the utility (Management and Support, Financial and Commercial, Customer Services, Technical)

[Annual running cost of main function / Total annual running cost] * 100

4.5 Depreciation costs

[Annual depreciation costs / Annual capital costs] * 100

ANNEXURE 4**RECOMMENDED QUALITY POLICY FOR THE NAMIBIA
WATER CORPORATION****1. THE QUALITY MANAGEMENT PROCESS**

NamWater adopted a Total Quality Management (TQM) approach to ensure the highest quality of water and water related services available to their customers.

The factors to be taken into consideration for the successful implementation of TQM in NamWater include:

- The organisation's strategic plan based on stakeholders' expectations, should be the starting point for developing a TQM policy
- Leadership commitment and dedication towards TQM. As quality is a strategic issue, top management should be the driving force behind TQM.
- Committed employees (from the CEO to the labourer) towards a zero-defects mentality
- Continuous preaching and communication of TQM at all levels in the company
- Empowerment of employees
- Increased employees' training on quality issues
- Recognise and reward employees commitments and initiatives towards TQM
- Appoint only those persons with attitudes and aptitudes right for quality-based performance
- The organisation's structure should be adapted to facilitate TQM
- Benchmarking and constant performance measurement and feedback
- Process improvement
- Setting of targets

- Closer customer relations
- Closer supplier relations

The NamWater employees (from the highest to the lowest level) are the key to the successful implementation of TQM. Management should ensure that the correct motivation, climate and structures are created within the company to make it easy for the rest of the company to follow.

2. QUALITY ASPECTS

The following quality aspects should be targeted within NamWater.

2.1 Support Process

2.1.1 Public health education

NamWater should actively promote public health education by creating awareness by the public on the dangers of water borne diseases and how to minimise the risk of contracting these diseases. NamWater should also become involved in research activities related to water borne diseases.

2.1.2 Staffing levels

NamWater should strive towards economic staffing levels coupled with efficiency. Due to the fact that the payroll in a water utility is a major part of the annual budget, the staffing levels are an important aspect to manage. Over-staffing cost money while understaffing could put public health and the environment at risk.

2.1.3 Training of employees

NamWater should ensure that staff members are properly trained, as skilled staff is essential for the prudent running of a water utility. Under investment in training can lead to public health, environmental, and health and safety problems.

2.1.4 Health and Safety

NamWater should aim for a zero accident rate. This can be achieved through proper training and supervision.

2.1.5 Asset Management

NamWater should manage their assets in such a way to ensure optimum utilisation. Capital assets may often last a long time but they do not last forever. Every utility needs not only to expand and develop its assets to meet new operating demands, but also to replace assets as they wear out. The rate at which assets wear out will depend on how they have been maintained.

2.1.6 Debt Management

NamWater should ensure that their debts are serviced in full from revenues earned. Annual debt service is the total amount of interest and principal paid during the reporting year in respect of both long term and short-term borrowings and overdrafts. This includes interest and principal that has been capitalised.

2.1.7 Liquidity Position

NamWater should ensure that it can meet its current liabilities with its current assets, i.e. there should be enough resources at hand to meet present financial commitments. Current assets include cash, stock, debtors and other short-term assets. Current liabilities include overdrafts, short-term borrowings, money owed to suppliers (creditors) and any other short term liabilities.

2.1.8 Strategic Inventory

Due to the fact that NamWater is dependant on import from foreign countries for a number of their strategic materials, inventory should be categorised as strategic and non-strategic. Strategic inventory is that which is essential to the operation of the business, for example key spares, which would not otherwise be readily available.

2.1.9 Cost

NamWater should implement measures to ensure that costs are monitored and controlled. The costs incurred by a utility have a major impact on the economic viability of the company. Costs could influence important financial decisions.

2.1.10 Income

NamWater should aim to provide a good service to customers whilst keeping charges as low as possible. The national average tariff for water is an indication of the effectiveness of the utility.

2.2 Sales Process

2.2.1 Population served

NamWater should aim for the highest service coverage possible. In general terms, the greater the service coverage, the greater is the utility's service to the local community in providing water supply.

2.2.2 Customer service

2.2.2.1 Subsidised water services

NamWater should strive to serve a greater part of the community who cannot afford full cost recovery tariffs by making use of indirect methods such as cross subsidisation. A national water tariff could play a major role in this regard. As NamWater is a full cost recovery company, direct subsidies by NamWater are not possible.

2.2.2.2 Customer complaints

NamWater should maintain a record of customer complaints received. A utility which maintains such a record is able to respond to customer needs and can demonstrate that it takes customer services seriously.

2.2.2.3 Customer surveys

NamWater should conduct regular surveys to identify customer needs and demands. A utility which undertakes such surveys can demonstrate

that it takes seriously the views and requirements of its customers. It is also a good way to canvass opinion about particular issues and can form part of evidence to the regulator to help justify improvement investment.

2.2.3 Revenue

2.2.3.1 Revenue collection efficiency

NamWater should ensure that the revenue collection efficiency is maximised. It refers to the amount of revenue collected compared to how much has been billed in the reporting year.

2.2.3.2 Average debtors days

NamWater should ensure that the outstanding customer debt at year-end is minimised.

2.3 Production Process

2.3.1 Water demand and sustainability of resources

2.3.1.1 Per capita consumption

NamWater should ensure that customers have enough water available to support daily needs but demand should not be so high as to be wasteful, damage the environment or be unsustainable in the long term. Excessive per capita consumption can lead to resource constraints and capital demand for additional capacity.

2.3.1.2 Water conservation programme

NamWater should guard against the excessive usage of water as a natural resource. Implementation of effective water conservation or water use reduction plans can lead to significant benefits related to the delay in large capital expenses.

2.3.1.3 Sustainability of water usage levels

NamWater should ensure that current water usage levels are sustainable into the future. This assessment may be based on formal assessments of resource availability and conservation, or it may be the utility's own

view as to whether water can continue to be abstracted at the present rate without depleting resources.

2.3.2 Utilisation of infrastructure

NamWater should ensure that the capacity of their water supply infrastructure is sufficient at all times to ensure the uninterrupted supply of water to their customers on a continuous basis.

2.3.3 Unaccounted for water

NamWater should put measures in place to minimise leakage and other system losses. For every system there is an economic level of leakage, that is, an optimum level of leakage for that system. This is derived from a balance between resource availability and demand, and cost of water, offset by the progressive cost of leakage reduction, such that in every system there is a point of acceptable leakage.

2.3.4 Interruptions in supply

NamWater should record on a routinely basis plant and infrastructure failures that effect customers. Utilities that record such failures are in a better position to effectively manage the assets under their control and have the information available to make decisions regarding any required remedial action.

2.3.5 Maintenance of infrastructure

2.3.5.1 Planned and unplanned maintenance

NamWater should ensure that its assets are being pro-actively managed. NamWater should determine its optimal level of maintenance since too little maintenance leads to deteriorating asset condition and service levels whilst too much maintenance is clearly prohibitively expensive.

2.3.5.2 Total maintenance cost

NamWater should optimise maintenance cost in comparison with total operating costs. The optimum level of maintenance depends on many factors, mostly specific to each utility.

2.3.6 Vehicles

NamWater should secure the availability and reliability of their vehicle fleet.

2.3.7 Water quality

NamWater should aim to improve water quality levels on a continuous basis and to maintain already achieved perfect levels. It is particular important to track performance over time. Where investments have been made to improve the quality of the water, the effectiveness of these investments should be measured over time.

ANNEXURE 5

**RECOMMENDED PERFORMANCE INDICATORS AND
TARGETS FOR THE NAMIBIA WATER CORPORATION**

1. SUPPORT PROCESS**1.1 Public health education**

NamWater should actively promote public health education by creating awareness by the public on the dangers of water borne diseases and how to minimise the risk of contracting these diseases. NamWater should also become involved in research activities related to water borne diseases.

Indicator

None

Target

Budget provision to reach a level of 0,1% of the annual budget of NamWater in five years time.

1.2 Staffing levels

Due to the fact that the payroll in a water utility is a major part of the annual budget, the staffing levels are an important aspect to manage. Over-staffing cost money while understaffing could put public health and the environment at risk. Economic staffing levels coupled with efficiency should be reached. The size of the utility plays a roll in determining this figure as larger organisations have the advantage of economies of scale.

Indicator

1. $[(\text{Total number of staff}) / (\text{Volume of water distributed in the year in m}^3)] * 1\ 000\ 000$

2. $[\text{Number of full time employees dedicated to a main function} / \text{Volume of water distributed in a year in cubic meters}] * 1000000$

Target

An economic number should be reached over a period of five years.

1.3 Training of employees

Properly trained and skilled staff is essential for the prudent running of a water utility. Under investment in training can lead to public health, environmental and health and safety problems.

Indicator

1. $[(\text{Total training costs in year}) / (\text{Total payroll in year})] * 100$
2. $[\text{Number of literate employees} / \text{Total number of full time employees}] * 100$

Target

1. Increase the training budget over a five-year period to reach the level of 3% of the total payroll per year.
2. Existing levels to be determined and a target be identified based on the existing levels

1.4 Percentage lost days due to accidents

This indicator is a measure of the health and safety record of the company. NamWater should be aiming for a low accident rate. This can be achieved through proper training and supervision. Only days lost due to injury at work are included – sick leave, compassionate leave and annual leave are excluded. The total days worked in the year are the total for all staff.

Indicator

1. $[(\text{Total days lost due to accidents in year}) / (\text{Total man days worked in year})] * 100$

2. $[\text{Total number of days of absenteeism during the year} / \text{Total number of full time employees}] * 100$

Target

NamWater should strive towards a zero accident rate.

1.5 Asset Management

Capital assets may often last a long time but they do not last forever. Every utility needs not only to expand and develop its assets to meet new operating demands, but also to replace assets as they wear out. The rate at which assets wear out will depend on how they have been maintained, and for every asset there is an optimal replacement time. The rate of pump replacement of say 20% relates to an asset live of 5 years while a replacement rate of say 2% relates to an asset live of 50 years.

Indicator

$[(\text{Number of pumps replaced in year}) / (\text{Total number of pumps at year end})] * 100$

Target

10%

1.6 Debt Management

Annual debt service is the total amount of interest and principal paid during the reporting year in respect of both long term and short-term borrowings and overdrafts. This includes interest and principal which has been capitalised.

Indicator

$[(\text{Total annual debt service}) / (\text{Total direct tariff revenue in year})] * 100$

Target

This indicator is a measure of a utility's ability to meet its debt service obligations from revenue earned. Revenue will not cover debt service obligations if the score exceeds 100.

1.7 Liquidity Position

The current liquidity ratio measures a utility's ability to meet its current liabilities from its current assets, i.e. whether there are enough resources at hand to meet present financial commitments. Current assets include cash, stock, debtors and other short-term assets. Current liabilities include overdrafts, short-term borrowings, money owed to suppliers (creditors) and any other short term liabilities.

Indicator

$[(\text{Total current assets}) / (\text{Total current liabilities})] * 100$

Target

Utilities with scores under 100 have more liabilities than assets and are financially over-committed. NamWater should strive towards a figure of more than 200.

1.8 Strategic Inventory

Strategic inventory is that which is essential to the operation of the business, for example key spares, which would not otherwise be readily available. Due to the fact that NamWater is dependant on import from foreign countries for a number of their strategic materials, inventory should be categorised as strategic and non-strategic.

Indicator

None

Target

To implement a strategic inventory system within one year

1.9 Cost

The costs incurred by a utility have a major impact on the economic viability of the company. Costs could influence important financial decisions and should therefore carefully be monitored and controlled.

Indicators

1. $(\text{Annual running cost} + \text{annual capital cost}) / \text{Volume of water distributed in a year in cubic meters}$
2. $[\text{Annual payroll} / \text{annual running cost}] * 100$
3. $[\text{Annual running cost of main function} / \text{Total annual running cost}] * 100$
4. $[\text{Annual depreciation costs} / \text{Annual capital costs}] * 100$
5. $[\text{Annual energy cost} / \text{Annual running cost}] * 100$

Target

Monitor trends and identify realistic targets within the next five years, or use data from the previous five years.

1.10 Income

The national average tariff for water is an indication of the effectiveness of the utility. Utilities should aim to provide a good service to customers whilst keeping charges as low as possible.

Indicator

$\text{Annual water sales revenue} / \text{Volume of water invoiced in a year in cubic meters}$

Target

The target for this indicator will depend on the costs incurred by the company. As NamWater is a cost recovery company, this indicator should at least equal the outcome of indicator 1.9 (1) above.

2. SALES PROCESS**2.1 Population served**

Utilities should aim for the highest service coverage possible. In general terms, the greater the service coverage, the greater is the utility's service to the local community in providing water supply. On the other hand, if a utility only serves the more affluent section of its area, it may have low service coverage, but they perform well in the indicators for debtor days and collection efficiency.

Indicator

$[(\text{Total number of persons served}) / (\text{Total number of persons in area of operations})] * 100$

Target

NamWater should aim for at least 90% service coverage.

2.2 Customer service**2.2.1 Subsidised water services**

As NamWater is a full cost recovery company, direct subsidies are not possible. However, by making use of indirect methods such as cross subsidisation, NamWater could serve a greater part of the community who cannot afford full cost recovery tariffs. A national water tariff could play a major role in this regard.

Indicator

Does NamWater provide subsidised water services?

Target

A water tariff policy that provides for a national water tariff should be drafted and implemented within a period of two years.

2.2.2 Customer complaints

NamWater should maintain a record of customer complaints received. A utility which maintains such a record is able to respond to customer needs and can demonstrate that it takes customer services seriously.

Indicator

1.
$$\frac{\text{[Number of complaints of quality of service during the year]}}{\text{Volume of water distributed in a year in cubic meters}} * 1000000$$
2. Number of billing complaints during the year / Number of registered customers

Target

Implement a system whereby customer complaints are recorded on a routinely basis. Monitor trends and identify realistic targets within the next five years.

2.2.3 Customer surveys

Utilities should conduct surveys to identify customer needs and demands. A utility which undertakes such surveys can demonstrate that it takes seriously the views and requirements of its customers. It is also a good way to canvass opinion about particular issues and can form part of evidence to regulators to help justify improvement investment.

Indicator

Does NamWater conduct regular customer surveys?

Target

NamWater must develop a questionnaire to conduct regular customer surveys.

2.3 Revenue

2.3.1 Revenue collection efficiency

This shows how much revenue has been collected compared to how much has been billed in the reporting year. It is in the utility's interests that the revenue collection efficiency should be maximised. It is possible to score greater than 100 for this indicator since revenue left uncollected from last year may be collected this year and added to the billed revenue this year.

Indicator

$$\left[\frac{\text{Total revenue collected in year}}{\text{Total direct tariff revenue in year}} \right] * 100$$

Target

It should be the aim of NamWater to score as near to 100% as possible over a sustained period of time.

2.3.2 Average debtors days

This is a measure of the outstanding customer debt at year-end. It is measured in terms of the number of days' worth of billings outstanding.

Indicator

$$\left[\frac{\text{Accounts receivable at year end}}{\text{Total direct tariff revenue in year}} \right] * 365$$

Target

It is in NamWater's interest to minimise this number. It should not exceed 45 days on average.

3. PRODUCTION PROCESS

3.1 Water demand and sustainability of resources

3.1.1 Per capita consumption

NamWater should be aiming for a middle ground here – customers should have enough water available to support daily needs but demand should not be so high as to be wasteful, damage the environment or be unsustainable in the long term. The per capita consumption measure is particularly useful when viewed over a number of years so that trends in customer use can be tracked. Excessive per capita consumption can lead to resource constraints and capital demand for additional capacity.

Indicator

(Total annual domestic consumption in litres) / (Total number of persons served) / 365

Target

Monitor trends

3.1.2 Water conservation programme

It is prudent for all utilities, especially those with high customer demand or water resource constraints, to guard against excessive usage of water. Implementation of effective water conservation or water use reduction plans can lead to significant benefits related to the delay in large capital expenses. However, it is not a general acceptable economic principle to promote the reduction in the use of the product you are selling.

Indicator

Does NamWater have a water conservation programme in place?

Target

Design a policy for the implementation of a water conservation programme.

3.1.3 Sustainability of water usage levels

This measure shows whether or not a utility believes that current water usage levels are sustainable into the future. This assessment may be based on formal assessments of resource availability and conservation, or it may be the utility's own view as to whether water can continue to be abstracted at the present rate without depleting resources.

Indicator

Does NamWater have a programme in place to assess the sustainability of its water sources on a regular basis?

Target

Do regular sustainability of demand and water sources assessments.

3.2 Utilisation of treatment works or other water supply infrastructure

This is a measure of the level of spare capacity based on current demand, to identify capacity constraints and where such constraints might be anticipated in the future based on demand growth pressures.

Indicator

1. $[(\text{Average daily volume of water treated in m}^3/\text{day}) / (\text{Total design capacity of all treatment works in m}^3/\text{day})] * 100$
2. $[(\text{Average daily volume of water supplied by a specific water supply infrastructure in m}^3/\text{day}) / (\text{Total design capacity of the specific water supply infrastructure in m}^3/\text{day})] * 100$

Target

1. If this indicator is above 80% (which means less than 20% surplus capacity), it indicates that the supply/demand balance is critical and that water conservation, leakage reduction and treatment capacity extension are measures which should be considered to address the potential shortfall.

2. The surplus capacity should be such to cater for demand growth during the next four years.

3.3 Unaccounted for water

This is a measure of leakage and other system losses. Unaccounted for water is taken to include leakage and theft. The indicator is therefore a measure of the amount of water produced over and above the amount of water consumed and the principal difference is likely to be leakage/system losses. For every system there is an economic level of leakage, that is, an optimum level of leakage for that system. This is derived from a balance between resource availability and demand, and cost of water, offset by the progressive cost of leakage reduction, such that in every system there is a point of acceptable leakage.

Water losses are the difference between system input volume and authorised consumption. Non-revenue water is the difference between the annual volumes of system input and billed authorised consumption.

Indicator

$$\left[\frac{\{(\text{Volume of water produced in a year in m}^3) - (\text{Volume of water billed in a year in m}^3)\}}{(\text{Volume of water produced in year in m}^3)} \right] * 100$$

Target

It is difficult to recommend a target value for unaccounted for water. It depends on the water resources position, cost of water, cost of leakage control and system characteristics such as density of connections and age of infrastructure. NamWater should monitor this indicator and determine a realistic target within the next five years.

3.4 Interruptions in supply

It identifies whether or not utilities routinely record plant and infrastructure failures which affect customers. Utilities which record such failures are in a better position to effectively manage the assets

under their control and have the information available to make decisions regarding any required remedial action.

Indicator

Does NamWater record interruptions in supply?

[Total number of interruptions which have an effect on customers /
Volume of water distributed in a year in cubic meters] * 1 000 000

Target

Design and implement a system to record interruptions in supply.
NamWater must track performance over time to identify trends.

3.5 Maintenance of infrastructure

3.5.1 Planned and unplanned maintenance

This is a measure of the degree to which the utilities' assets are being pro-actively managed. It is a leading indicator of the level of service to customers, i.e. poor performance in this indicator means that if sustained over a period of time, assets will deteriorate leading to reduced service levels to customers.

It is for each utility to determine its own optimal level of maintenance since too little maintenance leads to deteriorating asset condition and service levels whilst too much maintenance is clearly prohibitively expensive.

Indicator

[(Total planned maintenance cost) / (Total unplanned maintenance costs)] * 100

Target

It is particular important for this indicator to track performance over time and to identify trends. NamWater should determine the level of this indicator as applicable to their situation.

3.5.2 Total maintenance cost

This is a measure of the relative level of maintenance costs in comparison with total operating costs. The optimum level of maintenance depends on many factors, mostly specific to each utility, and cannot be determined as an absolute value.

Indicator

$[(\text{Total maintenance cost}) / (\text{Total operating and maintenance costs})] * 100$

Target

It is particularly important for this indicator to track performance over time and to identify trends. NamWater should determine the level of this indicator applicable to their situation.

3.5.3 Reservoir cleaning**Indicator**

$[\text{Volume of reservoirs cleaned during the past year} / \text{Total volume of reservoirs}] * 100$

Target

100%

3.5.4 Valve Inspection**Indicator**

$[\text{Number of valves inspected during the year} / \text{Total number of valves}] * 100$

Target

50%

3.5.5 Electrical equipment inspectionIndicator

[Number of electrical installations inspected during the year / Total number of electrical installations] * 100

Target

100%

3.5.6 Pump rehabilitationIndicator

[Total nominal power of pumps subject to repair and replacement during the year / Total nominal power of pumps] * 100

Target

5%

3.5.7 Pipe failuresIndicator

[Number of pipe failures (including valves and fittings) during the year / Total length of pipelines] * 100

Target

NamWater must track performance over time to identify trends.

3.5.8 Borehole maintenanceIndicator

[Number of boreholes inspected in a year / Total number of boreholes] * 100

Target

5%

3.6 Vehicles

Due to the long distances to travel, NamWater rely totally on the availability and reliability of their vehicle fleet.

Indicator

1. [Number of vehicles / Volume of water sold in a year in cubic meters] * 1 000 000
2. [Total distance travelled during the year / Volume of water sold in a year in cubic meters] * 1 000 000

Target

NamWater must track performance over time to identify trends.

3.7 Water quality

The measure used is the percentage samples failing to meet quality standards. It is particular important to track performance over time. Improving water quality levels should be the aim of all utilities that have not yet achieved perfection. Where investments have been made to improve the quality of the water, the effectiveness of these investments should be measured over time.

Indicator

[Number of tests failed] / [Number of tests performed] * 100

Target

It is difficult to recommend a benchmark for this indicator since the target should be 0%, although this may not be achievable in practice.

ANNEXURE 6**RECOMMENDED SERVICE STANDARDS FOR THE NAMIBIA
WATER CORPORATION****1. Complaints**

A substantive response to a written complaint will be made within 10 working days from the date of the receipt of the complaint.

2. New water connections

A new connection will be installed within 15 working days from the date of finalisation and signing of the water supply agreement and the receipt of all payments associated with the establishment of the connection, or at a date as provided for in the water supply agreement signed for that connection.

3. Supply interruptions

Customers will be informed in advance when planned work which involves interrupting water supply to customers for more than one hour will be done. Customers will be informed not less than five days in advance in writing or by way of public notice when the interruption will occur and when the supply is expected to be restored, unless otherwise provided for in the water supply agreement.

Unplanned interruptions will be repaired and at least lifeline water supply restored with due diligence. Customers will be informed on the extent of the interruption to their water supply as well as the expected repair time.

Written notice to the customer who will be affected when the interruption is due to insufficient source yield, will be given not less than fourteen days in advance.

4. **Water quality standards**

Water supplied for human consumption will comply with the officially approved guidelines for drinking water quality as prescribed by the Department of Water Affairs in the Ministry of Agriculture, Water and Rural Development. Water will be tested for three groups of determinants, namely:

- Determinants with aesthetic or physical implications
- Inorganic determinants
- Bacteriological determinants

Aesthetic, physical and inorganic determinants

The concentration of and limits for these groups define the classification of the water. The group in which the water is classified is determined by the determinant which complies the least with the guidelines for the quality of drinking water.

- Group A: Water which is bacteriologically very safe
- Group B: Water with good quality
- Group C: Water with low health risk
- Group D: Water with a higher health risk, or water unsuitable for human consumption.

Water treatment plants: Water samples are tested on a daily basis for turbidity, PH, conductivity and chlorine. Compliance tests for all other determinants are done on a monthly basis.

Borehole Schemes: Chlorine tests are done on a daily basis. Compliance tests for all other determinants are done on an annual basis.

General: If water is classified as Group C, attention will be given to the problem, although the situation is not critical yet. If water is classified as Group D, urgent and immediate attention will be given to this matter. Customers will be informed on any implications regarding the chemical classification of their water.

Bacteriological determinants

The bacteriological quality of drinking water is divided into four groups as well.

- Group A: Water which is bacteriologically very safe
- Group B: Water which is bacteriologically suitable for human consumption
- Group C: Water with a bacteriological risk for human consumption which requires immediate action for rectification
- Group D: Water which is bacteriologically unsuitable for human consumption

If the guidelines in Group A are exceeded, a follow-up sample will be analysed as a matter of urgency.

The frequency for bacteriological analysis of drinking water supplies will be as set out in the following table.

POPULATION SERVED	MINIMUM FREQUENCY OF SAMPLING
More than 100 000	Twice a week
50 000 – 100 000	Once a week
10 000 – 50 000	Once a month
Minimum analysis	Once every three months

Customers will be alerted immediately should the bacteriological quality of the water causes a threat to human health.

General

Whenever water quality problems are encountered at any water supply scheme, tests will be done more regularly as dictated by the situation.

5. Water conservation programme

To guard against excessive usage of water, NamWater will support any initiative in respect of the effective use of water.

6. Customer surveys

NamWater will conduct surveys to identify customer needs and demands on an annual basis.

7. Subsidised water services

As NamWater is a full cost recovery company, direct subsidies are not possible. However, by making use of indirect methods such as cross subsidisation, NamWater could serve a greater part of the community who cannot afford full cost associated with their water supply.

The Government may enter into a written agreement with NamWater for the supply of water, services or facilities by NamWater at a cost subsidised or fully paid for by Government.

8. Population served

NamWater should aim for the highest service coverage possible. In general terms, the greater the service coverage, the greater is the utility's service to the local community in providing water supply.

9. Public health education

NamWater will actively support public health education creating awareness by the public on the dangers of water borne diseases and how to minimise the risk of contracting these diseases. NamWater will also become involved in research activities related to water borne diseases where it may impact on the safety of the water supplied by the Corporation.

10. Utilisation of water resources

NamWater shall utilise the water resources available on a long-term sustainable basis.

11. Protection of water sources

NamWater shall take appropriate steps to ensure that the water resources available are protected from pollution caused by its operations.

12. Environmental protection

NamWater shall in the formulation of its policies and in the performance of its functions, take appropriate steps to conserve and protect the environment from damage, destruction or degradation, and to protect the flora and fauna, geological and physiographical features of special interest, and buildings, structures and other objects of architectural, archaeological or historic interest.

13. Public rights

In formulating its policies and carrying out its functions, NamWater shall have regard to the need to preserve public rights of access to mountains, forests, deserts, cliffs, foreshores or other open spaces and other places of natural beauty, and shall take appropriate steps for the preservation of such rights of access.

14. Records

NamWater shall prepare and maintain prescribed records, which shall be available for public inspection.

NamWater shall send to each customer at least once a year the address and telephone number of one of the offices of NamWater at which information regarding any matter included in the prescribed records maintained by NamWater may be obtained.