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**SUSTAINABLE QUALITY EFFICIENCY IN THE SOUTH AFRICAN ENERGY
PROVIDER**

**BY
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**A DISSERTATION SUBMITTED IN PARTIAL
FULFILMENT OF THE REQUIREMENTS FOR THE
DEGREE**

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DECLARATION

I hereby declare that this research study is my own work, submitted for the fulfilment of the MPhil Engineering Management at University of Johannesburg. This study has never been submitted for any degree at another university.

Signature:

Date:



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ABSTRACT

Eskom is committed to be successful and strengthens their business strategies by developing and improve their business processes. As electricity producing organisation is making every effort to count in order to be successful and strengthen their business strategies. It is very indispensable that businesses today need to be more effective and well-organized to design the most excellent products and provide outstanding services to their customers. There are quality factors that need to be calculated and monitored to ensure effective and efficient productivity.

Organisations should strive for operational excellence and continuous improvement by putting customers first and meeting customers' requirements will actually assist the organisation to move up the hierarchy. Even though it is commonly admitted that quality efficiency can produce a sustainable continuous improvement and competitive advantage, surprisingly slight or no hypothesis strengthen that idea [4] [6].

Accomplishing quality efficiency in the entire regions of a business is a challenging responsibility because customers revolutionize their quality perception every time. In general, electricity producing organisations or business's success relies on the truthfulness of its insights of customer prospects and its ability to closing the gap among those functional capabilities and prospects.

Good quality improves organisations returns and can be priced higher. Poor quality reduces the chances of companies to be competitive and enhances the cost of manufacturing poor quality products. Organisations market share can be increased if product conformance specification is improved and the cost of services will be reduced which will result into profit increase.

This study literature review purposeful on the theoretical benefits to improve quality efficiency, quality definitions, quality policy, fashion and sustain awareness of quality and quality culture importance, quality strategies, quality education and training,

applying Juran's Philosophy to energy (Electricity) products, contribution of quality gurus on quality Improvement, quality assurance, quality audits, impact of quality on customer satisfaction and sustainability of continuous improvement [9] [10] [11].

The study adopted both qualitative and quantitative research designs. A suitable sample was employed to accumulate crucial information by means of a self-developed questionnaire, surveys, interviews and observations. The questionnaires were extended and planned based on a widespread literature review to provide answers to research questions [12]. Sixty questionnaires were completed by participants from one hundred distributed.

Initially, result shows that employees agree that the use of quality circles are not fully used and practised in Eskom. From the results effective quality planning, monitoring and evaluating leads to customer's satisfaction, increasing of business growth and decreasing of the cost of poor quality . Respondents understood quality values, goals, objectives and its contribution towards overall performance and success of the organisation. The results show that Eskom management is committed and more involved in achieving sustainable quality efficiency in any capacity and making sure that process continuous improvement is sustained. Result shows that Eskom have made it their mission to satisfy customers in every capacity and they are practising the theory of customers are always right and first. Finally, there is a need in Eskom to raise quality awareness through teamwork and training.

The research additionally uncovered that Eskom need to do more on improving employees skills, providing integrated customer service and quality efficiency training, practising more of quality circles, planning and managing quality efficiency through collaborations, outlining quality objectives to employees, and implementing effective quality structure. The research study accordingly has hypothetical, realistic and methodological significance for the success of achieving and improving quality efficiency and sustaining continuous improvement in SAEP [1] [7].

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List of Abbreviations

BPC: Business Processes Capability

RQ: Research Question

TQM: Total Quality Management

QM: Quality Management

PDCA: Plan Do Check Act

JIT: Just In Time

EGU: Electricity Generation Unit

QC: Quality Control

QP: Quality Planning

QI: Quality Improvement

QIP: Quality Improvement Programme

TQC: Total Quality Control

FMEA: Failure Mode and Effects Analysis

QMS: Quality Management System

TPM: Total Preventive Maintenance

CI: Continuous Improvement

CQI: Continuous Quality Improvement

IOS: International Organisation for Standardization

OEE: Overall Equipment Effectiveness

SAEP: South African Energy Provider

SHEQ: Safety Health Environment and Quality



CHAPTER 1: INTRODUCTION

1.1 Background

The research purpose is to look for quality strategies that can develop and improve energy efficiency and effectiveness in the production of energy, specifically electricity. Eskom is the largest producer of energy in the form of electricity for South African communities and energy consumption is very high [81]. There are numerous challenges that are faced by the South African Energy Provider (SAEP) specifically at Eskom which are current blackouts, loss of production, rain, Medubi project and impacts of low grade coal. The energy efficiency improvement is measured as a powerful and is cost effective to support sustainable development through a cooperative awareness of financial escalation, social development , and uncontaminated environment [58] [60] [96].

Quality is very important factor today because of its extensive function which [69]. High quality approach guides to a sustainable competitive advantage [17] [74]. Organisations find it difficult in sustaining quality improvements and continuous improvement. According to Berlowitz [9], well-organised organisation growth lies with understanding and developing fundamental work procedures which are essential to sustain and uphold quality improvement (QI).The quality improvement (QI) components should be incorporated on a daily basis organisational system to sustain improvement and efficiency. Companies like Eskom and Sasol need to look for quality methods that enables them to achieve sustainable competitive advantage which will results in continuous improvement [76] [78].Organisations are participating on quality issues and utilising it as their organisational approach that organizes product quality or service rendered and try to finds sustainability of continuous improvement.

Today's increasing local and global business competition has expanded the significance of quality in achieving and sustaining a competitive advantage. More manufacturing organizations are searching for positive tools such as TQM to increase their competitive location [33] [54] [72]. It is generally accepted that quality techniques such as TQM can be able to produce a sustainable competitive advantage and also

providing sustainability. Quality means diverse things to different people. Quality efficiency is all about creating consumer fulfilment which guides to a developed competitive advantage and sustainable continuous improvement. [22], [28], [32] and [46] suggest that focusing on getting better quality to increase this capability rather than on established foci of accomplishment: market share, revenues, efficiency, share price or profits.

1.2 Problem Statement

Eskom need to understand the negative impact of poor quality planning which can be controlled by the utilisation of quality techniques in terms of Total Quality Management (TQM), Quality Audits (QA), Just-In-Time (JIT), Total Preventive Maintenance (TPM), and Six Sigma [5] [25] [53] [73] [75] [85]. The companies have to trust and have obvious understanding and to carry out a successful implementation of quality strategies and achieving continuous improvement. There are fewer organisations that have not succeeded in quality. There are various quality strategies which assist companies to again competitive edge, develop employees and increases productivity, profitability and reduce company costs, and need to be monitored carefully in order for organisations to be successful in quality [75] [85] [91].

1.3 Research Questions

Research questions are created as follows:

- Does Eskom have an effective quality department?
- Is quality planned and controlled in this company?
- Do employees know Eskom quality objectives and goals?
- Is Eskom committed towards accomplishing quality efficiency and continuous improvement?
- Does Eskom management make sure that consumers are content with the services provided?

This research questions were designed to accomplish presented research objectives.

1.4 The purpose of the research study

The purpose of this study is to develop and improve quality efficiency while sustaining continuous improvement at a South African Energy provider's Mpumalanga plant, which is one of the nine regions in South Africa. The study should assist employees and managers to identify quality related issues and discover integrated solutions which will advance the efficiency and effectiveness of their daily operations of organisation [90] [92]. The study aimed to provide methods that emphasize meeting customers' needs, maintaining continuous improvement, ,improving employee participation, encouraging team work, increasing competitive position, decreasing rework, enhancing quality efficiency, establishing good relationship between employees and top management and customers [39] [53] [54] [91].

1.5 Research Objectives

The main objectives of this study are to:

- Inspect whether Eskom has an effective quality department;
- Examine that quality is planned and controlled in this company;
- Inspect whether employees know Eskom quality objectives and goals;
- Explore Eskom commitment towards accomplishing quality efficiency and continuous improvement;
- Investigate that Eskom management make sure that consumers are content with the services provided.

Researcher will discover if integrated quality training programme is provided to all employees. Further, it will enforce an optimistic understanding about quality concept because quality is a business management device [99]. It's the responsibility of any organisation to fashion an affirmative quality culture. To accomplish these research objectives, the questionnaire was designed.

1.6 Significance of the Research

This study primary aim is to explore quality strategies which will improve energy effectiveness and efficiency of the organisation's operations and encourage outstanding support towards the implementation of quality continuous improvement [86] [87]. Organisations need to produce products of good quality or services which are designed according to customer's specifications and satisfy their needs. The organisation will prevent poor quality planning from occurring because it has negative implications on business sustainability and it will leave customers dissatisfied while the organisation will be losing competitive edge. Each business decision made today is based on customer achieving needs and improving business rented to them [54] [75].

1.7 Methodology

The research method for this study is both qualitative and quantitative in nature. Quantitative research entails utilize of well-organised questions where the answer options enclose a set of great number of respondents [13] [18] [20] [55] [80]. It is defined as a measurement which is objective and statistically valid. Quantitative research findings are arrived at using statistical methods.

Qualitative research is about gathering, analysing, and interpreting data which was collected from viewing what people say and do [13] [18] [20] [55] [80]. Quantitative research defined as measurements and counts of things, qualitative defined as the explanations, meanings, explanations, ideas, features, symbols, and descriptions of things [13] [18] [20] [55] [80]. One hundred participants were asked to respond to general questions. The researcher explores their responses to recognize and describe respondent's insights, views, or ideas being conversed and to establish the level of agreement which exist within the group. This research method type is often inexpensive than surveys which is exceptionally successful in obtaining data [41].

The structured questionnaires, surveys, short interviews and observations sheet were utilized to collect primary information from all employees of Electricity Generation Unit

(EGU). The secondary information was collected from library facilities and access assembled data from the organisations that would support the compiling of this study.

1.8 Research Delimitations

This study investigates the importance of effective quality strategy in the energy industry at Eskom specifically in the Electricity Generation Unit (EGU). The sample organisations investigated in this research was only the organisation that produce electricity which is Eskom, in Mpumalanga province. The information gathered from the organisation employees, was appropriate, truthful and advantageous to the completion of this study. In this study more highlighting will be given on the challenges relating to the procedure of quality consistency.

1.9 Key Assumptions

The key assumptions will give more insight of quality effectiveness in the energy production companies, thereby improving in particular quality approach. The assumptions made by the researcher were that:

- If quality is not planned and controlled across Eskom departments, it will result in increasing poor quality and failing to exceed customer expectations.
- If quality is planned, monitored and evaluated in Eskom, this will result in reducing the cost of poor quality.
- Misunderstanding of quality goals and objectives will result in poor performance.
- If there is lack of management commitment towards achieving quality efficiency and continuous improvement, it will result in employees being demotivated.
- If employees do not know customers' requirements, this will result in producing products that do not have customer's specifications.

1.10 Conclusion

This study will provide results in terms of quality efficiency, quality related concepts and its significance. Quality shows business significance in the continued existence of any company. Quality and its management are undoubtedly materialized as an essential aspect to success in all kinds of industries or companies, in expressions not of product quality but of the quality of the entire organisation's activities and practices. Quality presents resolutions to numerous dilemmas and intimidations encountered by South African companies in their mission to be globally competitive. The chapter highlighted problem statement, research objectives, aim, questions, importance of the research, methodology, research delimitations and key assumptions. The next chapter will focus on the relevant theoretical information gathered from different sources which is beneficial to the completion of this study. The next chapter will disclose the quality concepts in satisfactory details to recognize these possible or theoretical success aspects.

1.11 Chapters Outline

The following chapters will be covered in the completion of this dissertation:

Chapter 1: Introduction

This chapter focuses on the following sub-topics: Background, problem statement, research questions, aim, objectives, and importance of the research, methodology, delimitations and key assumptions.

Chapter 2: Literature Review

The Literature Review will framework quality theoretical concepts which are in relation to the research topic of this study. The application and utilization of the quality concepts will positively contribute to the successful of this dissertation.

Chapter 3: Research Methodology

The chapter provides detailed explanation of research methods related and determining research results.

Chapter 4: Research Findings

The chapter outline results, analysis and discussion, in relation to the research questions.

Chapter 5: Conclusion and Recommendation

This chapter will present the conclusion and recommendations derived from the results of the study.

Chapter 6: Summary

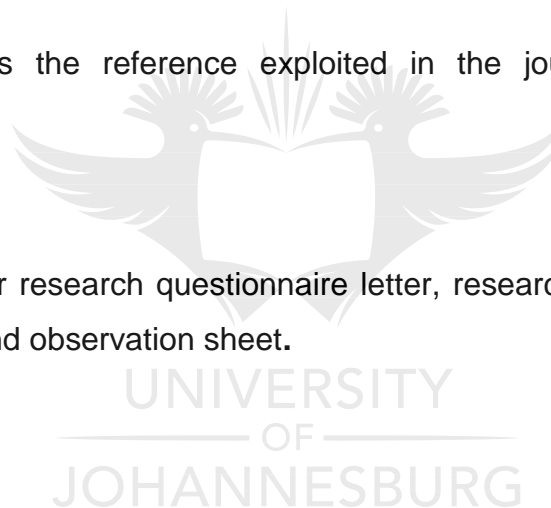
This chapter will cover objectives achievement, research limitations, and important points of the analysis and the advantages of the research.

Reference

This chapter displays the reference exploited in the journey of finishing this dissertation.

Appendix

This section will cover research questionnaire letter, research questionnaires, short interview questions and observation sheet.



CHAPTER 2: LITERATURE REVIEW

2. Introduction

Organisations to be flourishing need to express their potentials of manufacturing services and goods that match accurately with customer detailed prerequisites and guarantee required quality [75] [85] [91]. Quality is an approach of daily and organisational life and also is about enhanced business performance. Quality is significant because of its extensive function. Accomplishing quality efficiency in the entire regions of a business is a challenging responsibility because customers revolutionize their quality perception every time [5] [25] [53].

This chapter provides an overview on literature review about developing and improving quality efficiency and achieving continuous improvement. There are various concepts covered in this chapter which contributes to the success of achieving sustainable quality efficiency in an organisation. The literature review was performed to explore quality concepts that give to the success of accomplishing quality efficiency while increasing continuous improvement [9] [10] [25] [30] [45].

2.1. Quality definition

Feigenbaum [32], describes quality as not an engineer's determination nor a common management determination or a marketing determination but consumer purpose. The word quality has many different definitions from diverse perspectives, philosophies and their clarification of quality depending on individual perspectives. Others say quality is something that you can understand but is very difficult to communicate like love or beauty, others say quality originates in product characteristics and elements, others say if customers are fulfilled means that the product possess a superior quality while others think that if products match design specifications then they have good quality when some individuals think if the product is expensive in terms of the price, it has a good quality [25] [26] [73] [85].

According to Reid and Sanders [75] [80], quality meanings are as follows: conformance to requirements, worth for cost compensated, sustain services and suitability to utilize. etc. Quality means different things to different people. Quality is described as the amount to which a service or product profitably performs intended purpose of the customer during practice. Quality is a company concern not scientific matter anymore because it is becoming a principal priority for the majority of organisations. Further, Juran [46], defines quality as customer satisfaction.

The changing business conditions encourage organisations that have not yet embarked on quality journey to start because the market is looking for quality service and products. Achievement of quality necessitates the performance of an extensive selection of identifiable activities or quality responsibilities [46]. Feigenbaum [32] states that quality developed into the most essential mechanisms which lead to organisational growth and success in global markets. Organisations to survive need to generate products of high quality at a cheaper or lower price and consistently achieving customer's expectation [46] [54].



2.2. Eskom Safety, Health, Environment & Quality (SHEQ) Policy

Eskom is committed to executing and achieving their SHEQ Policies through:

- Application of suitable management systems (ISO 9001, ISO 14001 and OHSAS 18001);
- Make sure enough resources are accessible for SHEQ management and Eskom's suppliers meet its SHEQ prerequisites;
- Encouraging entirely employees to endorse on and off duty SHEQ practices;
- Raising SHEQ awareness through training, educating and lastly motivating; and engaging stakeholders;
- Complying with suitable legislative and other requirements Eskom subscribes to;
- Meeting stakeholders and customers' expectations and needs;
- Establishing and once in a while reviewing SHEQ intentions and evaluating performance to attain continual improvement;

SHEQ Policy should be created to supply the maximum values in quality related decisions to the functions of the company which guarantee an appropriate way of meeting quality objectives [32]. According to Feigenbaum [32], this policy is the broad premeditated prototype to administer and channel the entire management decisions in the product quality areas, consisting of consistency, safety, and other essential attributes. A quality policy is indispensable for increasing reliability in the organisation's objectives and goals. Once a plan is expanded, a company should be instituted to support the accomplishment of the plan.

Organisations are responsible for outlining their quality intentions [67]. A SHEQ policy declaration discloses most important road signs directing to total quality control. Organisations need to recognise that one of the primary quality actions when setting up for quality improvement is to build up a quality policy. The organisational quality policy has needs based such as social, business and customer needs, and it must obviously describe organisational objectives and goals. The firms have need of considering the following essential factors when developing quality policy: [5] [25]

- Resources;
- Market trends;
- Future growth;
- Market competition;
- Environmental factors;
- Suppliers or vendors;
- Available infrastructure;
- Customer characteristics;
- Major strengths and weakness of the organisation
[32] [53] [61] [75] [91].

Additionally, if organisation's policies and systems turn out to be motionless in excess of time, they will be unsuccessful to replicate competitive needs.

2.3. Create and Maintain awareness of quality

To make certain exploits on quality, a preliminary point is to fashion and distribute information on the present position of quality. The shared information outlines severe quality troubles encountered by the organisation and also provides a plan of action. Companies to build awareness require presenting the information or data in diverse languages for different people. The entire organisational staffs make use of diverse languages on daily basis operations and there is a need for creating quality awareness which replicates this. Management speaks one greatest language when creating quality awareness which is the language of money [32] [61].

Quality assists organisations with recognising chances of reducing cost of poor quality and eliminating income sales threats [25] [26]. Poor quality affects the performance of the organisation and encourages customers to change to a different brand, and an income sale is lost because of poor quality [88] [89] [98] [99]. Management is responsible for initiating and improving quality awareness inside the organisation. Employees might not comprehend or distinguish what quality standards are and how quality disturbs the finances of the organisation. Education is a technique that

increases quality awareness and implements policies to motivate compliance [32] [46] [73].

Organisations use continuous reinforcements (which are quality measurement) to sustain quality [93] [97]. According to Juran and Gryna [46], Quality measurements develop the vital signs that deliver individuals with information not only to execute their duties but also to maintain a continuing awareness of quality [94]. The sustaining of quality awareness may appeal upon a collection of methods and thoughts. It is essential for managers to outline current quality problems to employees, this will permit employees to provide integrated inputs and also allow management to encourage awareness of quality [44] [47] [57]. Management should discuss the penalties of poor quality effort to personnel because a low-quality product offends the business's reputation in the market place. To endorse quality awareness, formulate recompenses structure that make straight worker incentives with the firm's quality goals, this will help organisations to achieve high quality effort which leads to improved consumer retention and employment safety.

2.4. The importance of Quality Culture

Quality Culture is described as a configuration of human being customs, beliefs, behaviour, values and distressing quality [46]. It is also defined as the of group values which directs preparation of improvements on a daily operational exercises and results of production. Berings *et al* [8], state that quality culture is an organisational culture which subsidizes quality improvement to be efficient and effective. Quality culture is very important because of its expressive and operational approach which uses quality assurance instruments to guarantee and advance quality and sustain a vibrant alteration of the organisations [71].

Quality culture assists with holding organisations together and recognizing the culture that facilitates the firms to implement a quality strategy which inspires employees to embrace and make it a success [8] [32]. Quality is about collaboration, cultivating and implementing improvement initiatives, encouraging team effort, and sharing experiences. Quality is no longer the responsibility of quality managers but everyone's

responsibility because it drives organisation to be more competitive. Organisational culture is the set of mutual beliefs, attitudes, performance forms and values that distinguish the employees of the company [8] [71].

Organisational culture is a driving force that assists organisations to be healthy in meeting customers' requirements and getting behind what everyone does [71] [85]. Quality culture begins with leadership that comprehends and be certain of the consequences of the structure opinion and recognizes the importance of attending customers in order to be successful. It is a culture that stresses continuous improvement of business processes and fulfilling customer's needs, building a healthy working environment, and increasing profitability within the organisation [84] [91]. It can therefore be concluded that the quality culture within an organisation can actually play a critical part in how the personnel will observe quality.

2.5. The function of Quality Assurance

Quality Assurance is defined as some efficient method for guarantying quality throughout the succeeding stages in building up a service or product [46] [61]. Everyone within the organisation is responsible for quality, so organisations require a system that guarantees that the entire methods that have been premeditated and intended are pursued. Quality assurance leads organisations to achieving quality efficiency by expressing organisational efforts towards planning and putting a stop to difficulties from taking place at the source. It is intended at building up methods that avoid faults [53].

According to Dale [25], quality assurance is an avoidance based system which develops service and product quality, and increases production by emphasizing importance on service, product and process design. Quality assurance focal point is on the source actions and incorporating quality into planning and design stage, and assist with detecting defects in the early phase of the process. Quality is designed and planned in the early stage of the process not later in the control phase; most of the quality troubles are from deprived designs procedures and products. Quality

assurance department is responsible for developing, establishing and implementing written procedures to monitor or achieve below quality assurance activities. Quality assurance activities include: [32] [46] [59] [61]

- Failure mode and effects analysis (FMEA);
- Concurrent engineering;
- Experimental design;
- Process improvement;
- Design team formation and management;
- Off-line experimentation;
- Reliability/durability product testing.

These activities of quality assurance are very important in terms of assisting, improving and achieving quality efficiency in an organisation. Quality leaders are in agreement that quality can be guaranteed simply during the proposal stage. Quality assurance department make every effort for continuous improvement in quality of products despite the fact that it is working in cooperation with manufacturing, which tries to find continuous improvement in plants efficiency, performance, and yields. The most important purpose of quality assurance department is to ensure that all finished products or goods meet required specifications, including monitoring and following the entire procedures or steps connected with certification by the International Organisation for Standardization (IOS) [36] [52] [75].

2.6. Quality Audits

A quality audit is defined as a self-governing reconsider performed to associate various feature of quality performance which has a standard for the performance [46]. It is also a methodical assessment of a demonstrative pattern of the illustration and undertakings implication on a whole quality system. Organisations are using quality audit to assess their current quality performance, agents, supplier's performance, and licensees. Quality audits system should confirm the efficiency of a quality management system, the presence of objective proof indicating conformance to needed processes, to measure how magnificently processes have been executed,

and to judge the effectiveness of accomplishing any explained objective level. It assists organisations with removing and decreasing problematic regions and also with attaining continual improvement and become more competitive [4].

Quality audit is constantly executed against a documented system. The detailed function of quality audits is supplying self-sufficient guarantee such as, [4] [46]:

- Strategies of achieving quality are such that, if followed, planned in detail, the they will be attained;
- Healthy products are safe to utilize by customer;
- Government agencies, professional societies, and industry associations describes standards and regulations which should be followed;
- Conformance to requirements;
- Measures are satisfying and pursued;
- An information system presents sufficient and correct quality information to all concerned;
- Deficiencies are identified and corrective action is taken;
- Improvement opportunities are recognized and suitable employees made aware [73 [74].

For organisation to benefit from quality auditing, they must not simply account for corrective deeds and non-conformance but also emphasize regions of excellent exercise and supply confirmation of conformance. Quality audits have the following benefits which help organisations to improve quality efficiency and enhance continual improvement [32] [61] [78] [91]:

- Compel continuous improvement;
- Confirm compliance;
- Access efficiency and training;
- Supply contribution into executive decisions;
- Demonstrate management support of the quality program;
- Allow management to identify possible troubles or problems.

Quality audit is a significant instrument for continuous improvement and auditing company should pursue the audit phases. Quality audits revise customs to advance customer service and determine whether present customer service procedures are being completed [32] [46].

2.7. Utilisation of Quality Strategies

2.7.1. Total Quality Management (TQM)

Total Quality Management (TQM) is defined as a belief that outlines three principles (Employee involvement, Continuous improvement and Customer satisfaction) for accomplishing good quality and process routine [53]. TQM is the repetitive technique, system and consistent of meeting customers' expectations, empowering employees, attaining higher revenues, and lower costs, sustaining and maintaining the continuous improvement. Organisations put into practice TQM to elevate the competitive benefit, grow to be innovative, and increase the profits [83] [94] [99].

A complete application, utilization and implementation of TQM improve and increase productivity and quality efficiency in business companies [14] [84]. TQM tries to augment the related customer satisfaction, quality of products, and services by increasing quality awareness concerns from corner to corner of the organisation [21] [45]. TQM provides support for putting into practice production inventiveness and valuable quality that can enhance the competitiveness and effectiveness of the company which constantly develops its capability to produce services and elevated quality products to consumers [74] [75].

TQM stresses customer satisfaction underlying quality by utilizing employee involvement [54]. TQM should not only focus on improving results but more on advancing capabilities to manufacture enhanced products in the near future. TQM initiatives require everyone in the organisation to participate in its effort and help with improving employees' performance. Lastly its main objective is

to do right things first time, and every time. Businesses achieved advantages of TQM have fashioned an effective quality culture [83] [85].

2.7.2. Quality Management System (QMS)

Quality Management System (QMS) is a set of business activities concentrated on accomplishing organisational quality objectives and quality policy, continuously increasing efficiency and the effectiveness of its performance [32] [53]. QMS is articulated as the organisational methods, strategies, procedures, resources and structure essential to implement quality management. For organisations to accomplish their objectives, they are required to have a reliable and effective quality management system in place. The QMS main thrust is in well-defined procedures which result in the manufacturing of quality services or products, instead of distinguishing imperfect services or products after they have been fashioned. QMS is defined as a management system which guides and manages a company with regard to quality [5] [36] [39] [46] [59].

Quality management system purpose is to institute a support of orientation to make sure every time a process executed same data, schemes, expertise and controls applied and used in a consistent manner [25] [29]. For QMS to be successful they have to cover the entire organisation operation's performance. According to Goetsch [36], QMS comprise of all organisation's policies, procedures, plans, resources, process, compliance with ISO 9001 and description of responsibility and authority, all intentionally intended at accomplishing product or service quality levels consistent with customer satisfaction of organisational objectives and goals [36] [52] [63].

A QMS facilitates business to attain the objectives and goals get on in its approach and guidelines [82]. QMS supply reliability and fulfilment in expression of materials, techniques and tools, etc, and work together with whole organisational actions, opening with recognizing of customer needs and

concluding with their satisfaction, at each business boundary. The benefits of QMS are as follows [32] [46] [61] [73] [77] [89];

- **The customers' requirements:** Self-assurance in the capability of the company to distribute the wish for service and product constantly meeting customers' needs.
- **The organisation's requirements:** Efficient use of resources- individual, data, technology and substances are most advantageous on cost.

A good quality (QMS) will meet the following requirements to support system activities: [32] [46] [61] [73] [77] [89]:

- Put way and meet customers' prospects
- Increase team morale
- Advance process control
- Decrease waste or surplus
- Involve employees
- Coordinate training
- Lower costs
- Increase market share

A valuable QMS helps organisations to achieve the above responsibilities and improve efficiency and effectiveness [19] [31]. QMS adoption requires to be a premeditated decision of a business which is controlled by changing requirements, intentions, the product or services supplied, the procedures utilized, range and company structure. A QMS have to make certain that the services or products be conventional to the customer anticipations and requirements, and organisational objectives and goals. QMS concept develops

and leads organisations to enhance quality efficiency and continuously attain continuous improvement efforts and improve operations performance while increasing productivity and profitability [25] [32] [46].

2.7.3. Just-In-Time (JIT)

Just-In-Time (JIT) is described as an idea intended to attain high volume of production through removing waste and continuous improvement. Developed in Japan in the 1980s [80], Just-In-Time (JIT) is defined as a procedures, techniques or tools permit businesses to assemble and distribute products in little measures with small lead times to meet detailed consumer requirements. JIT means that every process accepts the correct elements required at the period they are wanted and in the quantity that they are have to produce an order from a customer with the maximum quality. JIT is an essential theory in the Toyota production system. JIT permits businesses to eradicate wastes such as defects, deprived delivery of components and work-in-process inventory [53] [85].

JIT is defined as an inventory approach organisations utilize to reduce waste and augment efficiency by accepting good quality products simply as they are required in the invention method, thereby reducing inventory costs. JIT is about decreasing inventory, acting in response to customers and diminishing waste. JIT emphasizes customer receptiveness, reduction of waste and continuous improvement. To accomplish the major intentions, JIT goes to inventory management, malfunctioning rate and lead time reduction. It assists organisations with improving overall productivity, responding to customers and provides cost effective production [73] [75].

JIT industrialized have competence, when appropriately adjusted to the firm; to reinforce the business competitiveness in the marketplace considerably by decreasing wastes and developing product quality and production efficiency. A successful JIT requires every employee inside the company to be involved and committed to it. JIT has the following benefits [85] [91] [98]:

- Low waste
- Low inventory
- High consumers responsiveness
- High quality production

These benefits encourage organisations to begin on the journey of implementing JIT and implementation requires employees to be very observant of everything that happens in the inventory carrying points and production steps. Organisations that apply JIT concept are constantly examining the invention process to be more efficient and smoother. The facilitation of JIT method requires a range of systems like Kanban. This is a Japanese method that guarantees an uninterrupted contribution of product or inventory; it was intended to maintain and sustain JIT concept [91] [100].

2.7.4. Total Preventive Maintenance (TPM)

Total Productive Maintenance (TPM) is an industrialized program intended at maintaining, sustaining and frequently improving quality manufactured goods, and business processes by taking advantage of involving all personnel, management, clients and suppliers, in order to achieve customer requirements or expectations [53] [85]. The TQM is a pioneering Japanese impression. TPM is defined as a maintenance program which entails a recently characterized theory for preserving apparatus and plants [26]. The TPM program objective is to noticeably enhance employment satisfaction, improving productivity and workers self-confidence [76].

Many manufacturing institutions are searching for practical instruments or techniques such as TPM to develop and increase their competitive spot. Once the products imperfections and equipment's breakdowns are removed, several TPM advantages are accessible as follows: cost and inventory reduction, quality and equipment productivity improvement, etc. The TPM approach assists augment uptime of tools, decrease costs and equipment set-up period,

and improve quality [15] [38]. During this approach, maintenance happens to be an essential ingredient of the team. The critical advantages acquired by executing TPM include improving production and increasing effectiveness or profit margins. TPM concentrates on maintaining entire apparatus in good quality working condition to keep away from interruptions and breakdowns in the manufacturing practice [42] [53].

TPM provides workers with a sense of understanding the accountability of the tools they utilise. TPM emphasizes equipment and machinery maintenance in order to decrease machine downtime and augment machine efficiency. One of the TPM benefits is that personnel gain an additional comprehensive understanding of the working of the structure and also grants them improved effort into their individual efficiency and the quality of their labour [5] [42].

For organisations to be successful and effective in TPM, they have to train their employees both in regular maintenance of tools, functioning measures and the occupied support of entire personnel is required. These have to result in attaining the goal of TPM which is to augment the quantity of the production, employment satisfaction and workforce morale. TPM can be seen as a technique to assist accomplishing the objective and goal of TQM. TQM and TPM can mutually result in an augment of quality efficiency. The TPM's main objective is to enhance the overall equipment effectiveness (OEE) of plant equipment [42].

2.7.5. Six-Sigma

Six-Sigma is defined as a flexible and widespread system that accomplish, exploit, and sustain company success by minimizing defects and variability in processes, the concept relies totally on the TQM principles [53]. It is defined as a group of instruments and methods for process improvement. The Six-Sigma's main purposes is to comprehend customers' requirements, information, utilizes controlled facts, numerical analysis, hard-working consideration to develop,

manage, recreate and improve all organisation processes [2] [39]. Six-sigma long term goal is to produce defect levels below 3.4 defects per million.

Six-sigma strives to accomplish improved quality of process productivities by distinguishing and eliminating the foundations of deficiencies (faults) and decreasing variability in organisation and industrialised processes [2] [7] [24]. For organisations to achieve six sigma goals, employees should be well educated and trained on quality efficiency concepts and customers' satisfaction. It performs significant function in the reduction of cost and process cycle time, escalates profit margins and customer fulfilment in an organisation. The Six-sigma assists organisations with accomplishing sustained quality improvement and reducing process variation which needs commitment and support from the entire staff [2] [23] [30].

Many organisations had embarked on six sigma initiatives with the purpose of improving quality and decreasing costs. Six-sigma in many organisations is basically meaning a measure of quality struggles that is close to perfection. It is well-organized, information motivated approach, method for getting rid of defects or errors in several procedures from industrialized to business and from product to service. There is a six-sigma model that helps organisations with developing and improving quality efficiency and decreasing costs, which called DMAIC Model (Define-Measure-Analyse-Improve-Control). The following steps comprise the six sigma improvement model (DMAIC Model) [53] [59] [61] [91]:

DMAIC Model



Figure 1: Six-Sigma Improvement Model (DMAIC Model) [2] [26] [39] [46].

Six-sigma is extensively found on statistics and information and determined by specialists in the methodology. DMAIC is defined as information motivated quality approach utilised to develop and improve business processes. It is fundamental component of a six sigma programme but commonly can be executed as individual quality improvement process.

2.8. The role of Quality Education and Training

According to Miltra [61], education and training is fundamental to quality improvement, availability of an adequate supply of people who are educated in the philosophy and technical aspects of quality. Quality training and education is the most essential factor in increasing and improving organisational performance, once there has been commitment to do so. For training and education to be more effective and efficient, it requires to be premeditated in an objective and methodical approach in order to make available the necessary.

The main objective of education and training is to provide employees with skills, understanding and knowledge to be able to execute their responsibilities and improve their confidence. Education and training observed as medium to instruct expertise required manufacturing quality products or services hence is a way of speaking a belief. Quality training awareness requires effective planning which addresses the needs of employees. A quality-related training is requirements to quality improvement activities to be effective [39] [61].

Training is an essential variable in the malfunction or accomplishment of an organisation's quality improvement program [65] [66]. Training does not only result in product improvements, organisational performance and service quality, but it also improves workers morale and skills like diagnosing, investigating, recognizing, and resolving performance and quality problems [68]. For training to be effective and efficient, it needs to be systematically planned. Quality training should be continuously being monitored, planned and evaluated to meet organisation's training objectives. Organisations should recognize successful models which assist with implementing quality training program. The implementation of quality training program requires outstanding support and commitment from management [46] [53] [61].

2.9. Applying Juran's Philosophy to Energy (Electricity) Products

To achieve quality efficiency, one has to commence by instituting the policies, vision, mission, objectives and goals. These goals can be achieved through three executive processes called the JURAN TRILOGY, which also known as three Universal Processes for managing quality.

Juran's Trilogy [46] [53] [73] [85] [91];

- Quality Planning
- Quality Control
- Quality Improvement

2.9.1. Quality Planning (QP)

Quality Planning (QP): It commences with recognizing customers, both external and internal, finding out their needs and developing product characteristics that respond to customer needs. Quality happens not by chance hence it should be planned.

The Quality Planning Process Steps:

- Project establishment;
- Recognize customers;
- Realize customer's needs;
- Improve products;
- Advance processes; and
- Develop controls and transfer to operations.

2.9.2. Quality Control (QC)

Quality Control (QC): it's a collective management process which conduct operations as to be responsible for stability and prevent contrary and "maintain the quo". It is also defined as a process which meets instituted goals by relating and appraising actual and planned performance, and consider action on the difference. It is responsible to determine what should be controlled, establish methods which measures the units and performance standards, etc.

The Quality Control Process Steps:

- Select control themes;
- Establish measurements;
- Establish performance standards;
- Measure real performance;
- Compare to standards (interpret the difference); and
- Make start on the alterations.

2.9.3. Quality Improvement (QI):

Quality Improvement (QI): it is defined as a process that creates breakthrough in all levels of performance which helps with removal of waste and defects to decrease poor cost of quality. QI is responsible for increasing value to customers and other stakeholder by improving process effectiveness and efficiency throughout the company. It is most excellently accomplished by categorizing particular projects for improvement, acquiring the correct people involved, diagnosing sources of poor performance and supplying medicines for the sources.

The Quality Improvement Process Steps:

- Identify a need for improvement
- Recognize improvement projects
- Institute project improvement teams
- Provide project teams with resources, motivation and training to identify the causes, stimulate the remedies and establish controls to hold the gains. All improvements take place on project by project.

2.10. The contribution of quality gurus on Quality Improvement

Quality improvement must be the intention of all individuals and organisations. The following concepts play an important role in quality improvement for every organisation which was developed by quality advocates. The points below are about developing and improving quality efficiency in the organisation.

2.10.1. A comparison of Deming, Juran, and Crosby

The below table outlines commonality and differences of three quality gurus approaches:

	W. Deming	J.M. Juran	P. Crosby
Basic quality orientation	<i>Technical: PDCA Cycle</i>	<i>Process: Juran trilogy</i>	<i>Motivational: Do it right the first time</i>
What is quality?	<i>No faulty systems</i>	<i>Fitness for use; freedom from trouble</i>	<i>Conformance to requirements</i>
Who is responsible for quality?	<i>Management: Customer driven</i>	<i>Management: Engineering driven</i>	<i>Taking upper view of Management</i>
Importance of customer requirements as standard	<i>Very important: Customer can only define the quality of any service or product</i>	<i>Very important; customers at each step of product life cycle</i>	<i>Very important: designing products that meet customers need</i>
Goal of quality	<i>Meet/exceed customer needs; continuous improvement</i>	<i>Please customer; continuous improvement</i>	<i>Continuous improvement; zero defects</i>
Methods for achieving quality	<i>Statistical; constancy of purpose; continual improvement; cooperation between functions</i>	<i>Cost of quality; quality trilogy: planning, control, improvement</i>	<i>14-point framework;</i>
Chief elements of implementation	<i>14-point program</i>	<i>Breakthrough projects; quality council; quality teams</i>	<i>14-step program; cost of quality; quality management "maturity grid"</i>
Role of training	<i>Very important for managers and workers</i>	<i>Very important for managers and employees</i>	<i>Very important for managers and employees</i>

Table 1: A comparison of Deming, Juran, and Crosby [22] [27] [28] [46] [48].

The abovementioned quality concepts highlight an incorporated complete method to improving quality that is determined by upper management. This comparison of quality gurus outlines their quality perspective which impacts positively the journey of this

study. This method implies that management need understand what quality is all about and the advantages be acquired as it relates to organisation's profitability. The company's attention must be on improving quality as described by the consumer or customer [54] [69].

These quality gurus have their individual impressions on how quality efficiency must be sized, managed and achieved. All these quality gurus have the same quality view. They all agree that customers are the final judges of what quality is and also agree that quality training plays important role when it comes to quality improvement and employees development. They differ in perspectives: Juran's perspective is more engineering determined, Deming's is customer focused, and Crosby's go beyond both of these, taking management upper view [22] [28] [32] [46].

2.10.2. The three stages of quality improvement

The quality gurus acknowledged and characterized the dissimilar stages connected with quality improvement. These stages play important roles in accomplishing quality improvement which are as follows [32] [46] [61];

- **Commitment Stage:** Management required to be committed to quality improvement initiatives or program, and organisational structure for executing build up plan should be in position. This stage removes employees' blunders, deprived quality of raw materials or improper devices.
- **Consolidation Stage:** Organisations are responsible for designing products that possess all quality attributes, meeting the requirements, and achieving improved productivity and efficiency of the process. This stage is about attaining zero defects, decreasing total costs by diminishing rework or scrap.
- **Maturity Stage:** This phase concerns the process accomplishing maturity, less defects products produced, improved quality and productivity, embarking on quality management concepts, employees participate in quality efforts and looking for new methods to improve the process performance.

These stages are integral part of quality improvement, and organisations are required to consider them when they are embarking on achieving quality efficiency and ideal goals such as sustaining continuous improvement, customer satisfaction and zero defects, etc [47]. The base of every quality improvement is to cultivate a quality culture or attitude inside the business and incorporate it all the way through the organisation [53] [61] [85].

2.10.3. Benefits of improving quality efficiency

The advantage of improving quality efficiency is to facilitate organisations in decreasing reworks and scrap, reducing production costs, increasing quality and efficiency, improving employee self-confidence, fewer burnout and absentees, and enhancing awareness and enthusiasm to improve work, and lastly increases competitiveness [49] [51] [56]. Customers are satisfied because their needs are met on a timely manner which assists with sustaining good quality relationships. Quality, productivity, profitability, flexibility, and customer service in manufactured goods design will endlessly advance and better organisations market position. There are numerous techniques that have been developed to accomplish, withstand and increase quality, they are quality improvement, quality assurance and quality control, which cooperatively are acknowledged as quality management [7] [61].

2.11. Sustainability of Continuous Improvement

Continuous Improvement (CI) was developed by a Japanese philosopher called Kaizen, and is the philosophy of repeatedly seeking methods to improve processes [53]. It is defined as an in-progress methodical attempt to improve everyday business performance to maintain effectiveness and remain competitive. Continuous Improvement (CI) helps organisations to recognize benchmarks of outstanding and exceptional training and encouraging logic of worker process ownership [35] [37] [49]. Competitive advantage is defined as strategy result which produces company better value, in relation to its competition; sustainability exist if increased value remains when contenders discontinue to impersonate the advantage [4].

Quality system helps organisations to improve their business processes and achieve sustainable continuous improvement [3] [16]. A quality system utilises the business model with a focal point on the customer which incorporates the full of life of change, continual improvement, revitalization and effective planning. Continual improvement is very important for an organisation to learn to grow which leads to improved profitability. For any organisations to be successful in sustaining continuous improvement, there is need to allow employees to become the mechanism of innovation and creativity [34] [40] [43]. Employees who are directly correlated with business processes are in the rightful place to be familiar with the changes that must be made. Organisations management and employees commitment play an important role in sustaining their business and accomplishing continuous improvement efforts [27] [61].

Continuous Quality Improvement (CQI) is a logical methodology to accomplishing continuing developments in the service or product. Organisations that are practising CQI are able to map the process, describe the problem, recognize improvement chances, implement the improvements and persistently monitor the outcomes for improvement opportunities. The utilization of CQI has numerous benefits which are as follows [1] [9] [32] [61] [78] [82] [86] [87]:

- **Improved morale:** The use of CQI assists with improving employee team morale by not accusing the workforce for the problems taking place in the system.
- **Better customer service:** CQI emphasises on constant improvement of organisational performance and eliminating difficulties from the scheme, customer satisfaction escalates.
- **Increased productivity:** Eliminations of faults from the process outcomes in less mistakes and a reduced amount of rework on the portion of the personnel.
- **Increased revenue:** The removal of mistakes increases customer service and organisational sales.

PDCA Cycle is a four step problem solving iterative system utilised to advance business practices, expresses and stresses that improvement initiatives or programs be required to commence with effective planning. The majority of companies aggressively occupied in continuous improvement (CI) train their work teams to utilise Plan-Do-Check-Act Cycle (PDCA Cycle) for solving problems. PDCA Cycle (Deming wheel or Shewhart cycle) consist of the following steps:

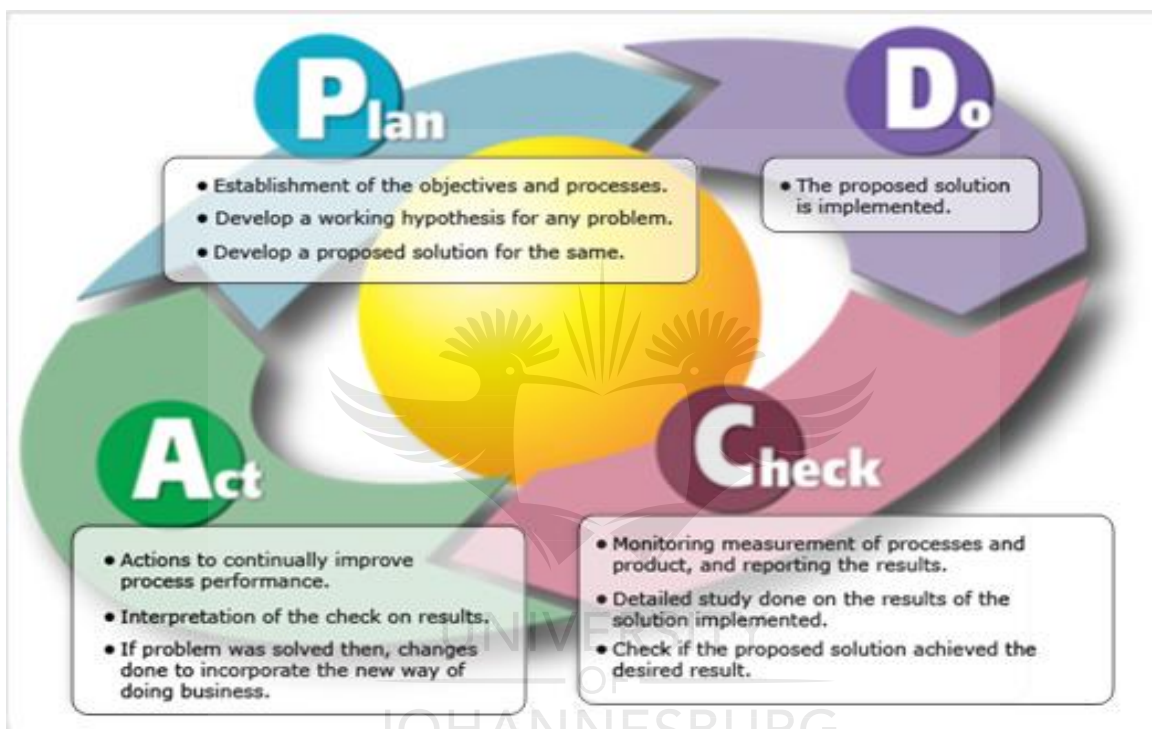


Figure 2: PDCA Cycle [53] [61] [73] [78] [84] [85] [91]

- **Plan:** Organisations need to identify problems and find possible solutions that improve their operation performance.
- **Do:** Organisations have to make changes on an investigational or small range as they help with solving the problems.
- **Check:** Continuously monitoring small changes if they are attaining expected quality outcomes.
- **Act:** Management and employees are required collectively to employ and implement changes on a large degree if the testing is thriving.

The exercise of PDCA Cycle helps organisations with managing and harmonizing continuous improvement efforts. PDCA Cycle can be utilised to influence

performance which penetrates undersized increased improvement in practices and assignments. For Organisations to be able to sustain continuous improvement in their businesses, they need to fully apply, utilise and implement quality techniques and tools like TQM and PDCA Cycle, this will enhance and increase organisation's performance. An in-progress attempt is required in which every personnel is permitted to assist accomplish the primary company objectives and goals of enhanced quality, delivery and cost [61] [75].

2.12. The impact of quality on customer satisfaction

According to quality gurus, quality should be described by the customers. High quality is a factor that indicates and improves customer satisfaction. All service or product characteristics that subsidize worth to the customer and pointer to customer satisfaction prerequisite to be addressed [64]. Every organisation is influenced by their customers, and essential to comprehend present and forthcoming customer prerequisites, must meet customer prerequisites, and make every effort to go beyond customer expectations. An organisation that produces products that are of good quality are in the better position to retain their customers and attract more new customers, this will make the firm to be more competitive [54] [69].

Customers are attracted to quality in general because organisations that produce products of poor quality fail to satisfy customer expectations. For companies to be successful in accomplishing customer satisfaction, they need to listen to service quality which assists with gaining competitive advantage [69]. The responsibility of every company management is to create, build and maintain good relationships with the consumers. If the consumers are satisfied and happy, it means that the organisation is providing a higher service or product quality. The fundamental of accomplishment in the present day's competitive background lies in distributing quality services and this will escalate the level of customer satisfaction [25] [26]. In today's competitive marketplace where organisations contest for consumers or customers, quality is seen as a fundamental differentiator. Improved quality products increase customer satisfaction, increase efficiency and profitability, and better their market position [54].

2.13. Conclusion

Quality improvement has to be the purpose of the entire organisations and personnel. It recovers profitability and rate of return by means of cost reduction and enhancing efficiency [61]. It is dependable with the beliefs that a business must frequently seek out to increase its competitive perimeter. Quality gurus agree and support that the improving of quality must be strategically designed and planned. Eskom is a quality centred culture which generates healthy working environment and results in accomplishing customers' satisfaction. It is imperative for Eskom to take into consideration the effects of not achieving quality efficiency because this will negatively have an impact on them. For Eskom to be successful in quality, they need to cover all quality concepts which have been exposed in this literature review.

Chapter 3 presents the research methodology. The following chapter discusses how the research questionnaires were formulated, administered and ways in which the participants were selected. The end results of the study are then analysed and interpreted.



CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

3.1. Introduction

Herein chapter, I present research methodology adopted, techniques employed in collecting the data, the research process followed i.e. administration and collection of questionnaires, how the data was analysed, the target population, the sampling methods and techniques. Research design reflects nature of study undertaken to provide adequate answers to the research problems [62].

The research method for this study is based on qualitative and quantitative paradigm. Quantitative research uses structured questions where responses are predetermined and large number of respondents is the objective. Qualitative research is about collecting, analysing, and interpreting data by observing what people do and say. It is also refers to measurements of things and counts, whereas qualitative refers to the concepts, definitions, characteristics, metaphors, symbols and descriptions of things.

Questionnaires, surveys, interviews and observations sheets were utilized to collect primary information from the Eskom Managers, Engineers, Artisans, Technicians, Supervisors, and Operators, Buyers and Draughtsman. The secondary information was collected from library facilities and organisations that supported the compiling of this study. The questionnaires were personally distributed to almost all employees of Electricity Generation Unit (EGU) at Eskom and accompanied by a covering letter which outlined significance of this study. Questionnaire design was kept short and simple due to time constraints. According to Kerlinger [50], research design was developed to help the researcher to answer questions as validly, objectively, accurately, and economically as possible.

Fifteen participants were personally interviewed, telephonically and via email due to not being available on the day of the interviews. The participants had to complete and hand delivery the questionnaires and some of the participants sent it back to the researcher at the agreed timeframe. According to Saunders [80], the interviewer was directed by a set of questions which intended to establish report from respondent

and produce richer data. The advantage of performing interviews in person is that you can gather more information based on what the interviewees are saying and can also ignore some of the insignificant information.

3.2. The Questionnaire Design

According to Leedy [55], a research design provides the researcher with basic directions or a recipe, and suggests that in selecting a design, the researcher should choose one that will provide relevant information to answer research questions. Researcher selected research design and formulation stage of the study process can be concluded.

The questionnaires were developed and structured based on extensive literature review. The questionnaire main function was to discover diverse opinions from different Electricity Generation Unit (EGU) employees about their quality efficiency perspectives in answering the questionnaire. The information collection and analysis concentrated on Electricity Generation Unit (EGU) employees at Eskom.

The design of the questionnaires was based on closed and scale questions. The closed questions were selected to present the researcher with consistent information that can be obtainable in a suitable layout that could be computed and evaluated. They were utilized to provide pre-coded information which could be investigated effortlessly and that the data was liable to be consistent and legitimate [55]. The questionnaires were formulated in such approach that they answer our research questions.

The questionnaire should not take longer to complete. The questionnaires consisted of two sections:

Section A: This section covered background profiles of the respondents. Background information of participants (Managers, Engineers, Artisans, Technicians, Supervisors, and Operators, Buyers and Draughtsman) was significant because it provided valid information which positively impacted this study.

- Work Experience;

- Highest Educational Qualification;
- Position or Job Title.

Section B: This section covered quality efficiency performance in the workplace. This section was concerned with knowledge relating to quality efficiency. Each research sub-questions had about ten questions so the questionnaire consisted of fifty short questions and ten short interview questions.

3.3. Short Interview Questions

Interviews can lead to a great deal of useful information [55]. The short interviews were formulated for those who were working either afternoon or night shifts in order to accommodate them. The main emphasis was on quality effectiveness and its evaluation. Ten afternoon and night shift employees were telephonically interviewed. The interview questions were included in the interview sheet as to gather more information and establish opinions in order to acquire common understanding.

3.4. Information Collection

The data gathering range from a simple observation at one location to an impressive survey of businesses into different parts of the world [13]. Data Collection was done by utilizing well designed self-administered research questionnaire which was straightforward and simple to complete [55]. The principal purpose of this study is getting views and opinions of the respondents and increases understanding of the research problem [96]. Formal discussions with employees were carried out to gather more data about the quality efficiency program. Data was edited to ensure consistency across respondents and to locate errors [13].

3.5. Secondary Information

Secondary data is defined as a data or information which have already been collected and recorded by someone else, usually for other reasons [13]. The main benefits of utilizing this concept of gathering information are that this method saves time and

money. The secondary data was collected from well-respected institutions which are local, national, international and governmental institutions or distinguished research agencies and other electronic data sources, for the purpose of this study at Eskom libraries and some retrieved from unit files and documentation. It's the responsibility of the researcher to be able to identify potential sources of secondary data. Secondary data is already present and is up to the researcher to commence analyzing the information in order to try finding a solution for her or his research problem [18] [50] [55].

3.6. Sampling Techniques

Sample is defined as a subset of population which represent main interest of the study [20]. A randomised sample from Managers, Engineers, Artisans, Technicians, Supervisors, and Operators, Buyers and Draughtsman of Eskom were used for purpose of this study. Sampling method aim was used to capture a representative cross-sectional sample of the total population [18]. The preparations were made with all relevant respondents that participated in the journey of the study.

The research study utilised purposive sampling technique. Leedy [55], refer this technique as method where people or other unit is chosen for the specific purpose. Selecting large sample was considered because some of the respondents were hard to find, and this resulted into a smaller sample. There are two important types of sampling methods which help with drawing population sample from organisation, namely:

- **Probability sampling** defined as a technique of describing a sample in which each sampling section has recognized non-zone view of being in the sample.
- **Non-probability sampling** defined as a sampling process where the opportunity of selecting each sampling division is unidentified.

3.7. Population

Population defined as collection of the entire remarks of an unsystematic variable within study and about which one is trying to draw conclusions in practice. It is also described in very particular conditions which include only those sampling units with features that is relevant to the problem [96].

The population utilised was the Eskom employees that have been employed for at least 12 months. This survey was carried out at Eskom in Mpumalanga Province. Sixty questionnaires were completed by participants from one hundred distributed. The study concentrated on the diverse ranks, qualifications and experience of the employees and their quality understanding and involvement. The population of this study comprised unit managers, chief and junior engineers, shift supervisors and operators who were directly engaged in the production of energy (Electricity).

3.8. Administration of Questionnaires

Self-administered Questionnaires are a cheap and practicable method of assembling information from outsized number of respondents. Physical information was well prepared by building up a plan on how to accomplish magnificent outcomes for the research study. Well-designed questionnaires are very effective in gathering more information [13] [18]. Most of the questionnaires were personally handed out and some emailed and faxed to all the Electricity Generation Unit (EGU) participants. Out of hundred issued questionnaires, sixty completed questionnaires were returned and analysed, the other twenty were blemished and ten were not completed and the last ten were not returned. Each research sub-question had about ten questions so the questionnaire consisted of fifty short questions and fifteen short interview questions, in total are sixty five questions and lastly accompanied by observation sheet [12] [55] [96].

3.9. Data Analysis

Data analysis is all about understanding and interpreting the outcomes of the data gathered so that the researcher can describe, conclude and make

recommendations. The statistical analysis technique (bar graphs, histograms, pie charts) is used on different frequencies and percentages achieved to establish whether important differentiations subsist related to research questions [55]. The researcher utilised statistical analysis and tabulation to analyse the information presented in this report. Primary data collected from using questionnaires while secondary data were collected from journals, articles, books [12] [13]. The questionnaires consisted of two sections. Section A which focused on demographic profiles of the respondents and section B covered quality efficiency performance in the workplace. The descriptive analysis was used to analyse the demographic profiles of the respondents, and the findings were presented in percentages [96].

Leedy [55], provides useful information relating to method used to analyse data from different perspectives on how people experiences regarding particular concept is suggested:

- Identify statement closely to the topic: this means that while the research is conducted the researcher must collect only relevant information and break that into small phases, then give them a format and meaning.
- Gather this information into units, putting them in diverse categories; these categories should be linked to the phenomenon being studied.
- Seek different opinions, hire the researcher to analyse different people ideas, experience regarding the phenomenon to reach a conclusion.
- Construct a composite: the research uses all information and make a conclusion according to the peoples' experience.

3.10. Information Validity

Validity refers to extent which instrument measures what is supposed to be measured, while reliability refers to consistency with which measuring instrument yields firm results when entity is been measured and have not changed [55]. The questionnaire will not require respondents names and this will allow respondents to provide honest information and observations will be done in the same approach to investigate the correct completely detailed information. The validity of this study was achieved by

comparing different research studies [20] [55] [96]. It is the view of the researcher that content validity is the most excellent validity measurement for the research.

3.11. Study Limitations

The study was limited by various reasons which are as follows: [13] [20]

- Insufficient data;
- Time and budget constraints;
- Confidentiality of organisation information;
- Ethical and legal restrictions;
- Uncooperativeness from the organisation and contributors.

3.12. Conclusion

This chapter discussed the methods that were utilised in generating the information or data. The quantitative and qualitative research methods were utilised and random samples were drawn. Questionnaire assessment was approved as the most important mechanism for this research. It investigated the approach the questionnaires were administrated, collected and analysed.

The next chapter will focus on the statements of findings and data analysis that were acquired from the questionnaires. The next chapter presents findings of this study.

CHAPTER 4: RESEARCH FINDINGS

4.1. Introduction

This chapter presents findings relating to importance of quality efficiency in the energy (electricity) industry. Informed by the generated data in the study, I provide answers to the research questions. This chapter outlines the outcomes and analysis and explanations of information or data from the questionnaires provided by the respondents.

The structured questionnaires were utilised as a main component of collecting data from participants or respondents. The questionnaires were dropped in a box by participants and collected, and some were electronically emailed or distributed. Electronically emailed or distributed questionnaires are complex to find out their accuracy response because they were forwarded from one participant to the other [12].



4.2. Findings

4.2.1. Section A: Background or Demographic information

4.2.1.1. What is your highest educational qualification?

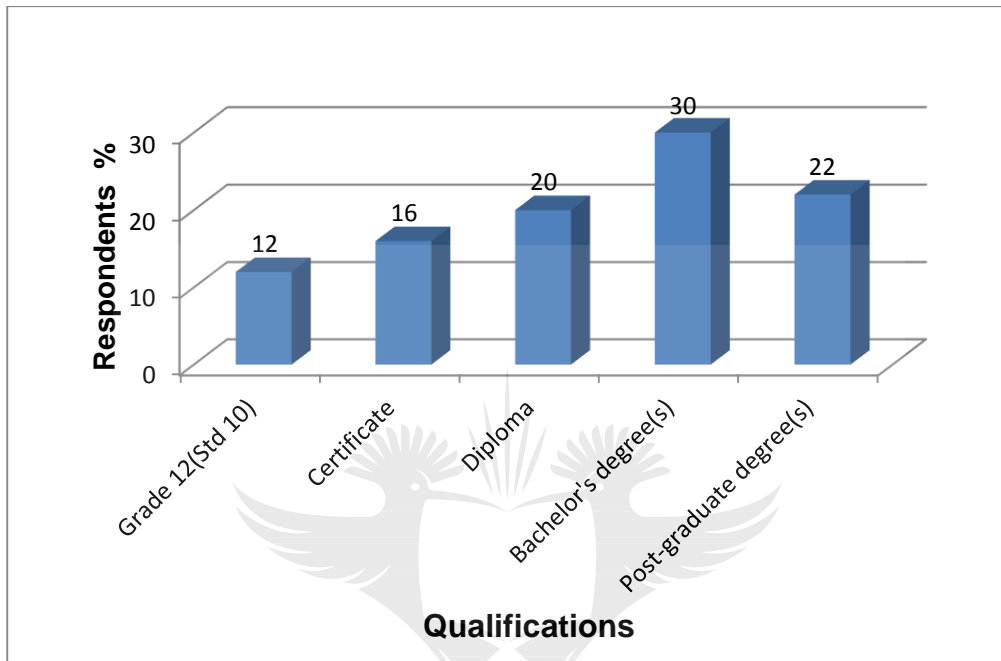


Figure 4.2.1.1: Highest Educational Qualification

Figure 4.2.1.1 above demonstrates that there are respondents with bachelor degree (30%) in their field of study, followed by respondents who have post-graduate degree (22%), followed by diplomas (20%) and certificates (16%) holders with grade 12 (12%) as minority.

The educational background of respondents has a positive impact on the study because they have provided valid information and also positive responses which helped accomplish research objectives of this study. Well-trained or educated employees collectively make decisions that influence the success of the company in achieving organisational goals and objectives and their aggressive targets [5] [10] [53]. Well educated employees are asset to the company because they can share their skills, knowledge and provide mentorship for unskilled employees.

4.2.1.2. How long have you been working in this field?

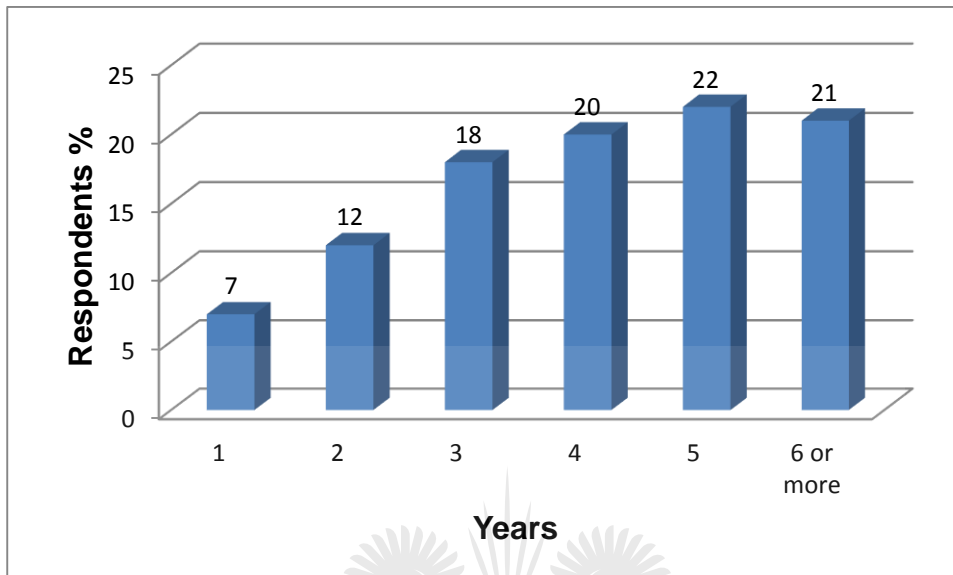


Figure 4.2.1.2: Work Experience

Figure 4.2.1.2 above indicates that participants who have four, five, and six or more working experience (63%) have more working experience and provided valuable information to this study. 37% of respondents have a less working experience (one to three years working experience). Eskom have to provide integrated training program which can sharpen, teach, empower and improve employees skills and knowledge in operational.

63% indicate that Eskom have experienced staff which have acquired knowledge to a gain understanding, and skills to improve their individual performance to provide quality effort. The result indicates that more knowledgeable participants have more skills to fuels Eskom to be effective and efficient in executing their business goals.

4.2.1.3. Which position or job title best describes yours?

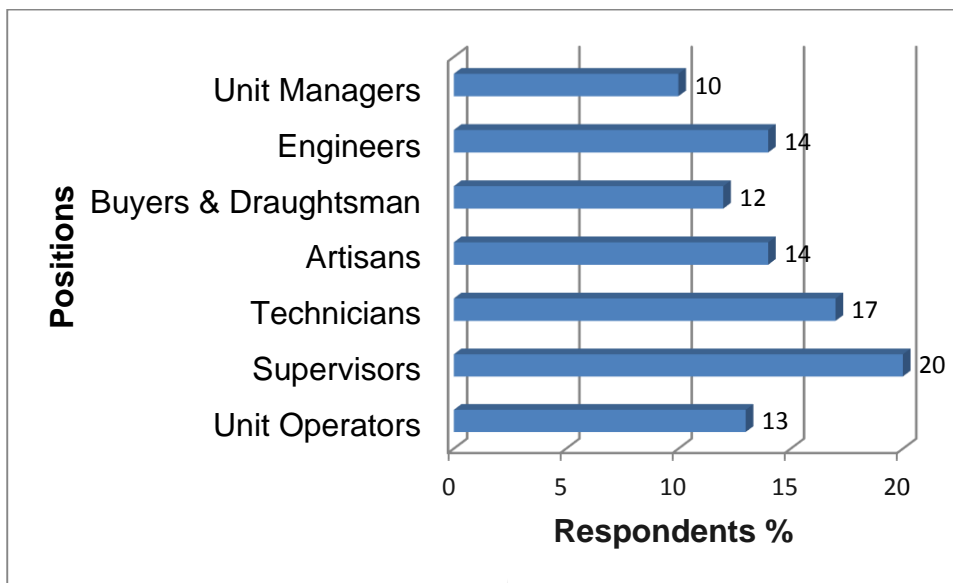


Figure 4.2.1.3: Position or Job Title Analysis

Figure 4.2.1.3 is representing the importance of job title, 24% is made of unit managers and engineers which this roles requires participants who have detailed understanding and knowledge. 76% is made up of Operators, supervisors, technicians, artisans and buyers, and draughtsman. Eskom managers and engineers provide direction to other position holder as abovementioned. The results show that all this position requires each other in order to build successful organisation like Eskom.

This section A has provided valuable information of respondents which helped the researcher to complete the study. Respondents provided valid and important information about their backgrounds (Education, Work experience and job title) which positively impacted this study.

4.2.2. Section B: This section covers quality efficiency performance in the workplace. This section concerns your knowledge on quality efficiency.

4.2.2.1. RQ 1: Does Eskom have an effective quality department?

No	Questions	Yes (%)	No (%)
1	Is there a quality department in this unit?	70	30
2	Is management committed to attaining quality efficiency?	65	35
3	Employees have a good understanding of what practical quality definition is?	56	46
4	Do employees support and participate in quality initiatives?	50	50
5	Does the organisation use quality circles?	45	55
6	Does this organisation make every effort for zero defects?	75	25
7	The department use quality tools to improve their processes?	60	40
8	The department need to train employees on quality principles and philosophies?	56	44
9	Quality leadership is essential to quality efficiency in this unit?	51	49
10	Personnel know their quality responsibilities?	48	52
Mean		57.4	42.6

Table 4.2.2.1: RQ1

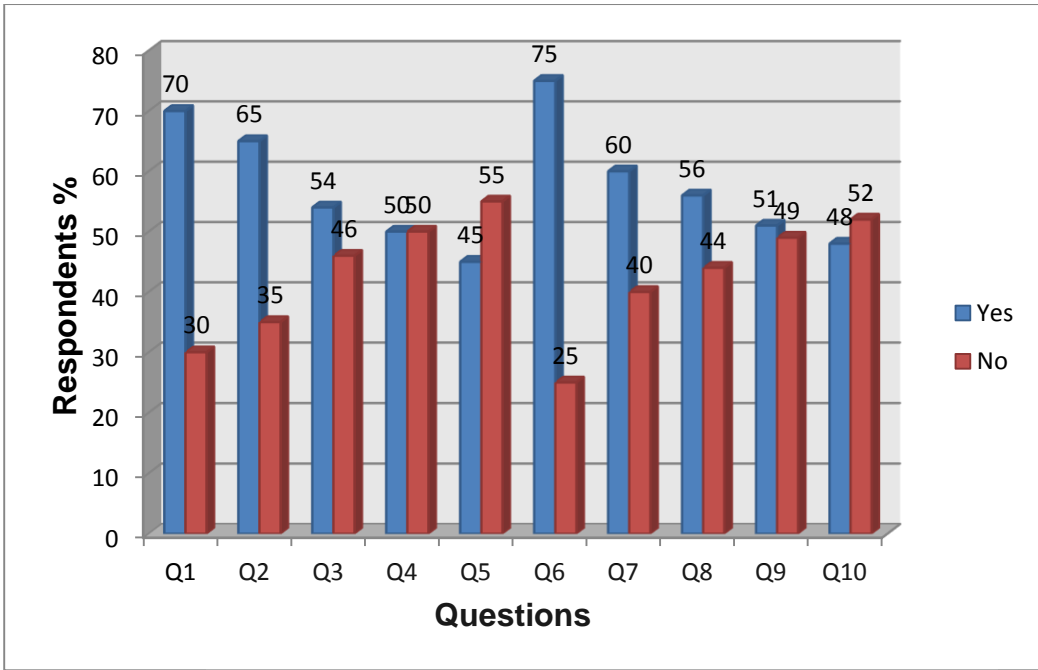


Figure 4.2.2.1: RQ1

The most essential questions range from 60% to 75%. The most important question is perceived to be Q6 (Does this organisation make every effort for zero defects?) while Q1 (Is there a quality department in this unit?), Q2 (Is management committed to attaining quality efficiency?) and Q7 (The department use quality tools to improve their processes?) are perceived to be the least significant. The results show that 30% of respondents did not know if there is quality department in this EGU. It is clear that employees agree that the use of quality circles are not fully used and practised in Eskom. It is the responsibility of every company quality department to make sure that their workforce are trained and equipped on quality concepts like quality circles.

4.2.2.2. RQ 2: Is quality planned and controlled in this company?

No	Questions	Yes (%)	No (%)
1	Is quality planned, monitored and evaluated across the company's departments?	48	52
2	Do employees understand the implications of poor quality planning?	75	25
3	Is there exiting quality procedure in place?	71	29
4	Is quality managed through collaboration?	37	63
5	Are there measures used to evaluate quality performance of the unit?	50	50
6	Are quality plans being re-examined and carried out on a regular basis?	53	47
7	Do employees know, understand and practise quality policies?	55	45
8	Do employees know the different between strategic and operational quality planning?	46	54
9	Is quality planning steps outlined to employees?	41	59
10	Are quality risks recognised?	62	38
Mean		53.8	46.2

Table 4.2.2.2: RQ2

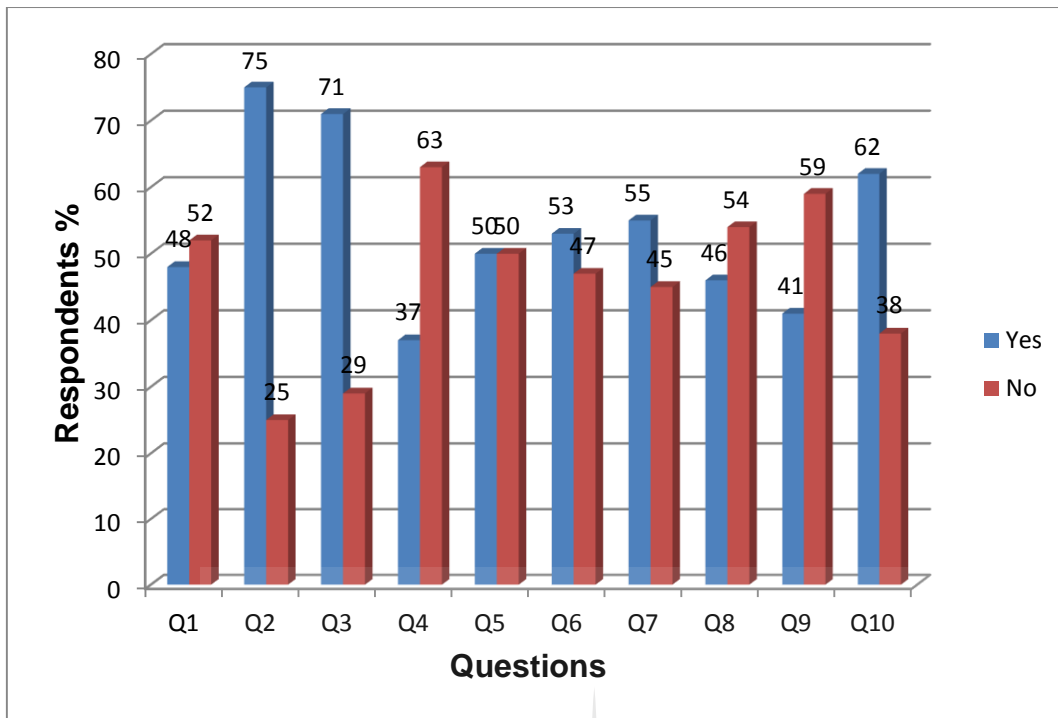


Figure 4.2.2.2: RQ2

Figure 4.2.2.2 above illustrates that 48% (Q1: Is quality planned, monitored and evaluated across the company's departments?) of respondents did not know if quality of the products was planned and controlled, but knew that it was monitored and evaluated. This suggests that 75% of respondents understand the implication of producing products of poor quality or rendering poor services to customers [25]. From the results effective quality planning, monitoring and evaluating leads to customer's satisfaction, increasing of business growth and decreasing of the cost of poor quality [26].

4.2.2.3. RQ 3: Do employees know Eskom quality objectives and goals?

No	Questions	Yes (%)	No (%)
1	Are quality goals and objectives clearly defined?	68	32
2	Are departmental quality objectives and goals aligned with one of entire Eskom?	64	36
3	Do employees get involved in engineering quality activities?	57	43
4	Does the top management pledge and participate in quality performance?	80	20
5	Do employees know the effective use of quality management system (QMS)?	70	30
6	Does management disperse quality objectives to all employees?	50	50
7	Are employees allowed to provide their viewpoints on quality management?	60	40
8	Is there implemented system for attaining the objectives and goals structured efficiently?	54	46
9	Quality tools are used effectively?	74	26
10	Is there comprehensible relationship between key objectives, organisational goals and quality activities?	66	34
Mean		64.3	35.7

Table 4.2.2.3: RQ3

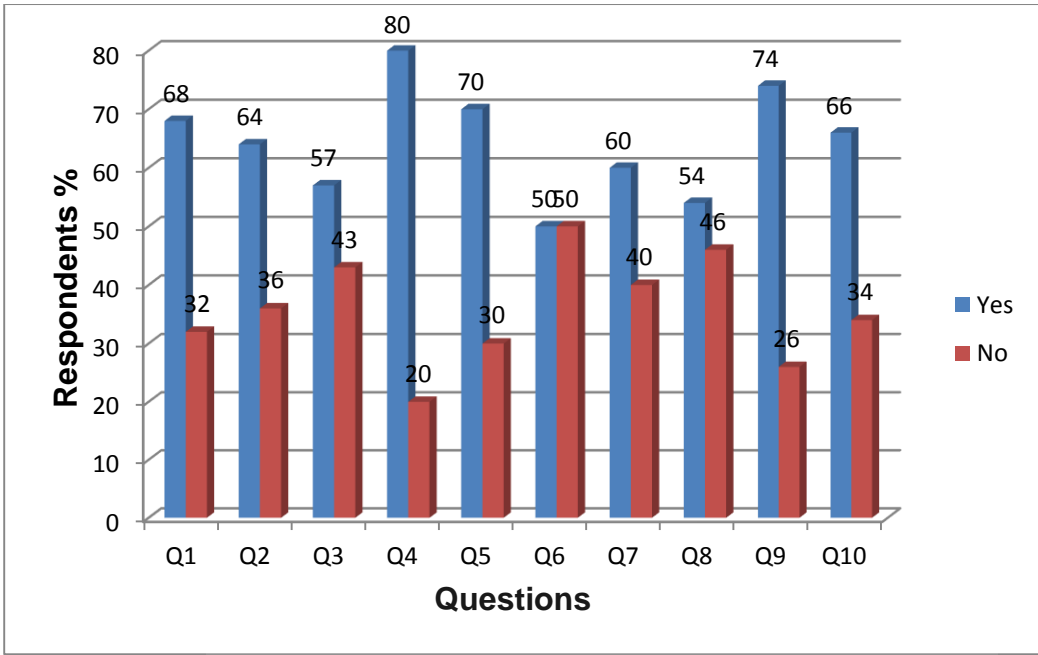


Figure 4.2.2.3: RQ3

The findings relating to respondents knowing and understanding departmental quality objectives and goals show that, (Q1: Are quality goals and objectives clearly defined?) is achieved 68%. The result indicates that 68% of respondents agree that quality goals and objectives are clearly defined and understood by the workforce. Participants clearly understood quality values, goals, objectives and impact on overall act and success of the Eskom.

4.2.2.4. RQ 4: Is Eskom committed towards accomplishing quality efficiency and continuous improvement?

No	Questions	Yes (%)	No (%)
1	Are leaders committed to quality efficiency and continuous improvement (CI) sustainability?	73	27
2	Is quality efficiency measured?	69	31
3	Does Eskom frequently develop effectiveness and efficiency of entire quality processes?	70	30
4	Do quality techniques utilised in sustaining continuous improvement (CI)?	65	35
5	Is quality training conducted as it improves and sharpens employees' skills to perform better?	66	34
6	Is quality management system (QMS) utilised effectively as it is a tool that enables companies to maintain control, and create stability, predictability and capability?	71	29
7	Is quality inspection performed?	70	30
8	Are all quality tasks and processes standardised because they improve quality efficiency and sustain continuous improvement (CI)?	67	33
9	Is there effective and efficient quality implementation structure in place?	60	40
10	Is there full support during quality improvement implementation?	63	37
Mean		67.4	32.6

Table 4.2.2.4: RQ4

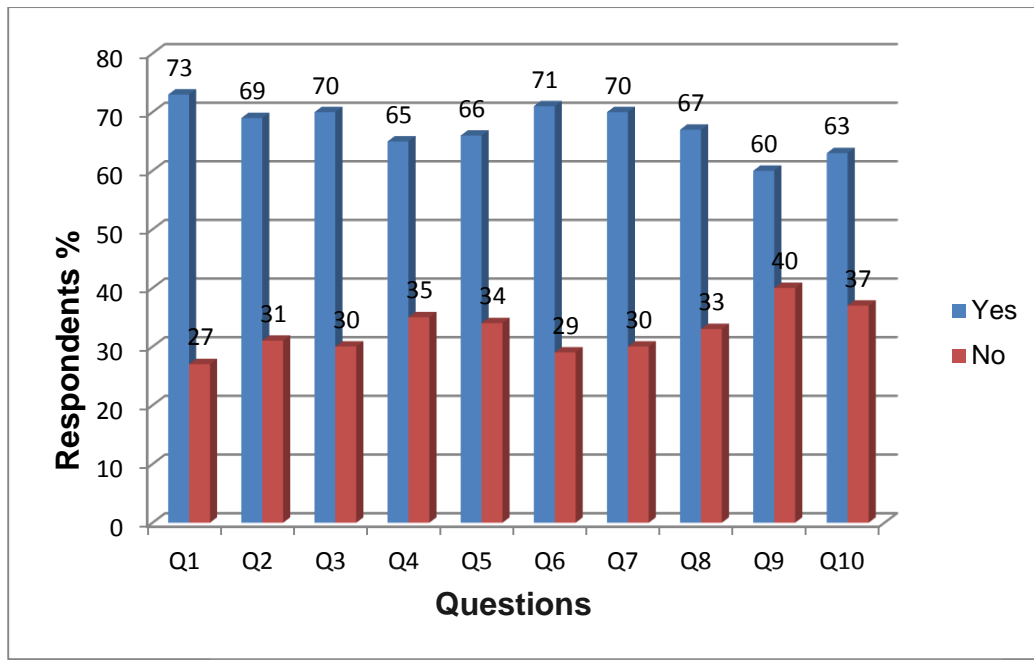


Figure 4.2.2.4: RQ4

Figure 4.2.2.4 above illustrates that 73% (Q1: Are leaders committed to quality efficiency and continuous improvement (CI) sustainability?) of respondents agree that Eskom management and quality leaders should be committed to achieve quality efficiency and continually improve sustainability. This indicates that participants understand that there should be appropriate quality efficiency and continuous improvement measures in place. The results show that Eskom management is committed and more involved in achieving quality efficiency in any capacity and making sure that process continuous improvement is sustained [54]. The unit should have new strategic continuous improvement techniques in place to improve and empower worker's skills sequentially to work independently [91].

4.2.2.5. RQ 5: Does Eskom management ensure customers are satisfied with services provided?

No	Questions	Yes (%)	No (%)
1	Do products possess attributes of customers' expectations?	81	19
2	Does Eskom allow customers to be involved in designing product quality?	70	30
3	Do employees get involved in customer relation activities and be trained on the concept?	55	45
4	Are customer needs made known to employees, and product-related value perfectly considered through externalities components?	79	21
5	Is customer satisfaction measured within your organisation?	50	50
6	Are customers significant for the sustainability of the business?	60	40
7	Does Eskom aggressively and frequently look for customer's contribution to recognize their expectations and needs?	62	38
8	Does the company understand customers as they are key to quality management efforts?	80	20
9	Do customer complaints considered as utmost important input that assist in improving processes?	75	25
10	Are customers' requirements successfully circulated and understood throughout personnel?	78	22
Mean		69	31

Table 4.2.2.5: RQ5

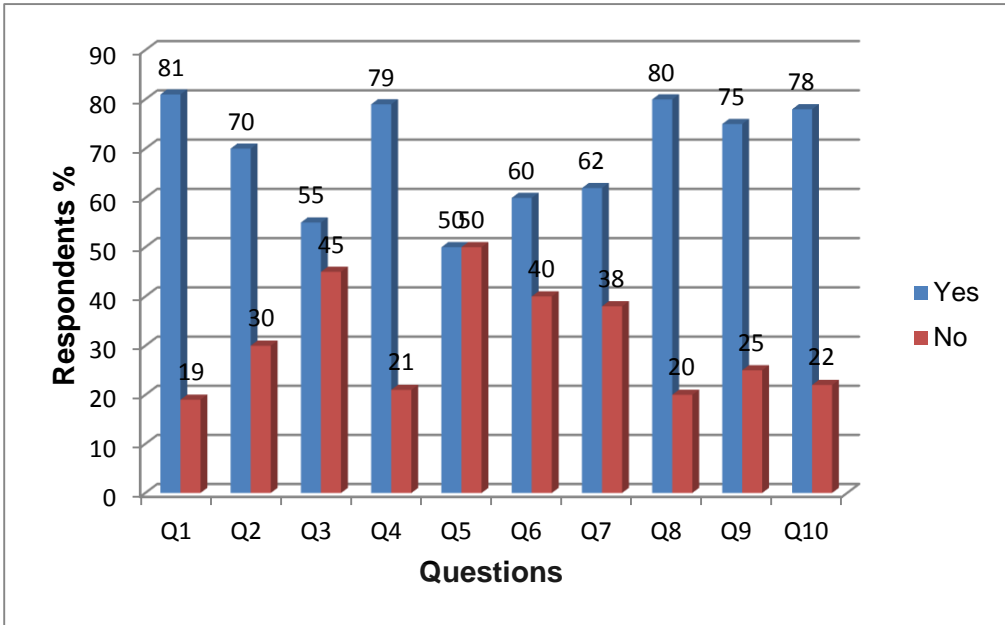


Figure 4.2.2.5: RQ5

The results indicate that 81% of respondents agree that Eskom management should involve customers in the designing process of their products. From Figure 4.2.2.5 employees are aware and know what is expected of them in terms of meeting and exceeding customers' expectations. Customers are very imperative for the sustainability of the business. Result shows that respondents agree that Eskom should made it their mission to satisfy customers in every capacity and they are practising the theory of customers are always right and first. High quality is a factor that indicates and improves customer satisfaction.

4.2.3. SHORT INTERVIEW QUESTIONS

The questions were designed to acquire quality understanding and opinions from employees and management at the Electricity Generation Unit (EGU) in Eskom, and their impact on the business of the organisation.

<p>Participants 1,2,6,8 and 9.</p>	<p>The participants showed that are knowledgeable about quality concept and what is lacking is quality training [26]. Training is one of the methods that encourage employees to perform better and improve their skills. More participation of employees in training programs improves the results of the organisation [39]. Eskom is an organisation that has exceptional quality culture and encourages employees and management to be involved in quality activities and strive for achieving sustainable continuous improvement and quality efficiency, and excellence.</p>
<p>Participants 3,4,5,7 and 10.</p>	<p>Rewards and recognition motivates employees to take great pride in their work and attempt for improvement because some of the participants felt that organisation does not do much to reward them or trust them to make correct decisions since they have been involved in every day dispensation of the products [73] [75]. Some of the participants felt that quality vision and mission are not clearly explained to them and the same applies to customers' role and requirements. Participants felt that homogenizing quality policies across the departments have a superior positive impact on the quality of goods supplied [91].</p>

Table 2: Interviewers responses

4.2.4. OBSERVATION SHEET

The observation sheet was utilised to record the problematic issues that were encountered during the plant inspection and working procedures. The cause-and-effect diagram is utilised to outline the foremost reasons that obstruct the process. The problems are recorded on the observation sheet and fish-bone diagram (cause-and-effect diagram) is utilized to analyze them [91]. The following are the main reasons that are observed to be obstructing the business processes (**refer to annexure D**): [53] [75] [85]

a) Material:

- Product guidelines
- Damaged materials
- Malfunctioning parts and spares
- Poor material handling

b) Methods (Processes):

- Incorrect parts number
- Inadequate space for storing
- Disturbances for looking for apparatus, utensils, and resources
- Indistinct guidelines to unskilled workforces
- Processing is prolonged
- Incorrect product data and description
- Improper instruments

c) Measurements:

- Improved number of tours (time lost)
- Increased distance moved
- Poor inventory control
- Interruptions due to extensive check ups

d) Manpower:

- Incompetence to carry out activities at particular periods

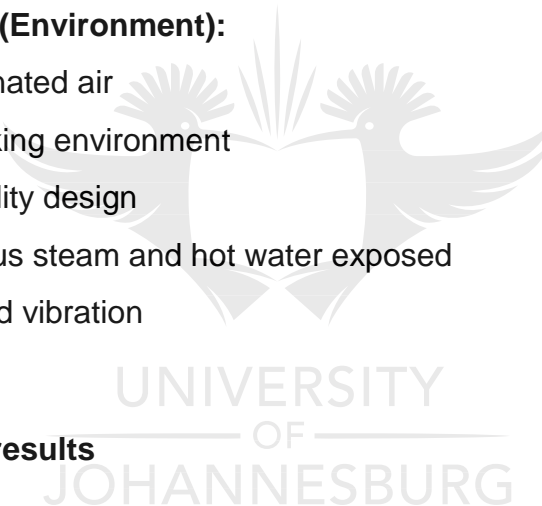
- Employees do not follow orders
- Poor decision making
- Lack of enthusiasm to apply new functioning methods
- Regular idling due to workforces waiting for supervisors
- Organisation functioning 24hours results in exhaustion

e) Machine:

- Old equipment ends in regular breakdown
- Regular apparatus or machine breakdown
- New employees find it difficult to operate automatic machines
- Malfunctioning products

f) Mother Nature (Environment):

- Contaminated air
- Bad working environment
- Poor facility design
- Hazardous steam and hot water exposed
- Noise and vibration



4.3. Summary of the results

Current research results revealed that:

- The company need to do more to raise quality awareness and inform other employees about the quality unit.
- The company should make it their mission to plan, monitor and evaluate quality.
- Departmental quality objectives and goals should involve employees in formulating the goals and objectives, eliminating misunderstanding and mistakes committed by the workforce where quality are concerned.
- Management should be committed and involved in accomplishing quality efficiency in any capacity and making sure that continuous improvement is sustained.

- Commitment by management and employee recognition will improve capability and overall performance of the company.

As from results and discussions of this study, it is clear that Eskom management should allow employees to participate in attaining organisational objectives and goals. Successful quality implementation results in customer receiving correct commodities at accurate period, price and place which have good quality [85]. Achieving sustainable quality efficiency will enhance customer satisfaction and make the company's commodities more cost effective and competitive. Eskom should find new methods of doing things right and rapid without compromising the quality of their products or services rendered [53]. Company should be quality driven not production driven. Every company to be successful in implementing continuous improvement and achieving business sustainability needs to be creative. Company must have provision of resources for quality improvement [82] [87].

Initially, result shows that employees agree that the use of quality circles are not fully used and practised in Eskom. From the results effective quality planning, monitoring and evaluating leads to customer's satisfaction, increasing of business growth and reducing cost of poor quality. Respondents clearly understood values, goals, and objectives of quality, their impact on overall performance and success are tremendous. The results show that Eskom management is committed and more involved in achieving sustainable quality efficiency in any capacity and making sure that process continuous improvement is sustained. Result shows that Eskom have made it their mission to satisfy customers in every capacity and they are practising the theory of customers are always right and first. Finally, there is a need in Eskom to raise quality awareness through teamwork and training.

The purpose of short interview questionnaire, and observation sheet was to obtain an understanding of the constraints relating to Eskom operations and their impact on the ability to produce quality products that meet customer expectations, reduce waste, and minimize cost. The next chapter is going to contain conclusion and recommendations.

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

This study focused predominantly on developing and improving of quality efficiency while sustaining continuous improvement in the SAEP. Conclusions and recommendations are drawn from results and findings of the research study and literature review utilised. It also provides appropriate recommendations for the business in order for them to develop and improve the state of quality efficiency.

5.2. Recommendations

- A research study can be performed to explore how sustainable quality efficiency can be implemented and reveal accomplishment rate of every performance system. Information can be utilised to formulate a well-designed structure for sustainable quality efficiency implementation in an energy provider company. Based on the studies, the following is recommended: Top management should permit workforce to partake in the development and establishment of standards that improve working environment and assist them to accomplish widespread goals and objectives.
- The company should offer integrated quality training to all employees that will increase employee's efficiency and effectiveness that can also improve quality of the products or services provided.
- Top management must consider utilising JIT, TQM, TPM, 6-Sigma, and QMS systems because they strengthen and support cost reduction, increase productivity efficiency, and improve quality.
- Employees should be able to identify defects and renovate quality at every phase of electricity processes.
- Quality should become a fundamental ingredient premeditated which involves everyone.
- Organisational goals should be associated via management hierarchy to detailed process actions.
- Management and workforce should work collectively to improve quality efficiency processes.

- Quality review meetings should be instituted because they help the organisation identify how far they are with achieving quality efficiency.
- Managers' focus should be on execution and sustainability of improvement programs in expressions of quality, speed, dependability, flexibility and cost.
- Managers should sustain TQM programmes to guarantee planned sustainable competitive advantage.
- Customers should be involved in every stage of designing the products because these assist company to produce products of good quality and know customer's requirements.
- Eskom should always focus on quality improvement processes until they are well incorporated into every day practice of the employees.
- Eskom management should integrate SHEQ concerns into their operations.
- SHEQ training and awareness should be strategical plan and executed.
- Management should encourage employees to support and participate in quality initiatives.
- Eskom leadership must formulate understandable vision, mission, and quality goals, and should clearly be communicated to the entire staff through different education interventions such as integrated training and coaching and mentoring.
- Eskom quality department need to actively be involved in different kinds of quality improvement methods.
- The company should formulate effective quality awareness structure that meets everyone's expectation.
- The company have to have an effective rewarding system to inspire new ideas.
- Management should aggressively be committed to continuing quality improvement (QI).
- Eskom should create an understandable culture of quality by giving appropriate resources and infrastructures to employees.
- Managers should institute aspirations and measures that direct and track improvements that will continually improve effectiveness and efficiency of all quality processes.
- Management should be responsible for implementation of quality management (QM) as a high priority business strategic initiative.

- The company must frequently plan, monitor, and evaluate quality performance.
- The company should institute well organised structure that reports quality incidents that will affect the service or product.
- Continuous improvement should become integral part of everybody's usual purpose.
- The company should invest more in training of people in general.
- The approach and intelligence and performance of workforce are essential to quality efficiency success.
- The company must be stable because stability is the requirement for quality revolution.
- Complete application, utilisation and implementation of quality techniques and tools will guarantee quality success.
- The company should strive to maintain and improve quality efficiency.
- There should be effective communication among managers and workforce.

5.3. Conclusion

It is the responsible of every workforce to participate in achieving quality efficiency. Employees identify areas which have potential of improving processes and produce quality products or services. One of the leading blunders organisations make in applying quality is not involving sufficient people. It is imperative for the company to value their clients or customers and strive to keep them satisfied by all means. Sometimes customers feel neglected because they are not involved in the designing of the products or services rendered.

Employees are involved in developing and improving quality efficiency process. In achieving quality efficiency and sustaining continuous improvement the relationship between managers, employees and customers is very important for success of business. It was very challenging to raise quality awareness because it requires having effective integrated training program in position. In general extensive training is required to those employees who struggle to perform their responsibilities because

this is a beneficial investment that company can do to improve their business strategies.

Eskom must make sure that employees know what best practices are in each district of their company, ensuring that every individual from different positions is well trained in the skills and work traditions that are appropriate to attaining their objectives and goals, these abilities should be consistently utilised at the maximum potential performance level, assign adequate influence at each level to enable teams to actively attain their goals and hold people accountable. These will assist company to gain competitive advantage and thrive in achieving quality efficiency while seeking methods that will continuously improve their business processes.

Customer focus, training and education have positive impact on employee's skills and morale. Eskom needs to focus on quality improvement processes until they are well incorporated into every day practice of the employees. This needs managers to carry on reporting methods and response to the workforce, train well and instruct all latest workers, and retrain personnel if improvement stages are not sustained. Workforce must be able to identify methods or ways that would assist sustain continuous improvement process in the company. Once employees understand their involvement and contribution in quality efficiency, it is indispensable to its accomplishment, productivity improve and self-confidence. Employees turn out to be empowered through involvement on quality improvement groups.

The company needs to encourage all employees to participate in this kind of studies because it is beneficial to them and the company. It is the responsibility of every company to encourage employees to participate and support quality initiatives and also be involved in quality process as it will improve the results of the firm. Many companies that fail to plan quality often struggle in business because customers are enticed by products of good quality and satisfying services. Good quality planning, monitoring and evaluating, improves and increases business position and reduce the cost of poor quality. Eskom must certainly not let their guard down while it comes to quality management or else things can go wrong and this can have negative impact on the stakeholders and company.

Quality leaders are responsible for outlining quality objectives, goals and steps to employees so that they know what is expected of them. The company need to encourage all their employees to be committed to quality efficiency and continuous improvement (CI) sustainability. Quality is a weapon that makes organisations grow to their full potential and become globally competitive. Quality is regarding how glowing the product is invented and meets the customer prerequisites. A high-quality product means preserving customers. Quality should be company's pinnacle planned driver and its leadership should promote a mutual customs achieved within quality philosophy.

Company that is not yet into quality should start implementing quality and utilizing quality techniques because these will improve their business. Most companies do not frequently and actively look for customers' opinions to discover their prospect and necessitates. This makes customers feel neglected and less important so Eskom need to have complaints mechanism that will help address customer's complaints. Customers are imperative for the sustainability of the business. For quality efficiency to be flourishing all work procedures should be homogenized or standardised. Well-equipped or knowledgeable employees are very important for quality success.

Every company like Eskom are looking for methods to frequently continue being competitive and provide their customers with quality products, but to do that, they have to improve their functions through training and learning, employees participation and recognition, leadership, continuous improvement, and other important tools such as TQM, PDCA, Six Sigma, and BPC. Many companies find it difficult to maintain or continue improvement after implementing changes; often they cannot accomplish their targets.

Eskom must incorporate safety, health, environment and quality requirements into its activities so that results are made to guarantee the consideration of social equity economic development and environmental quality. This will results in helping continual improvement routine and accomplishment of stakeholder necessities. Organisations like Eskom to succeed in achieving sustainable quality efficiency needs to adopted SHEQ management as a business imperative for sustainable business performance and improvement. Compliance with the SHEQ Policy will

simplify the accomplishment of Eskom's strategic goals and objectives; and will be the accountability of every contractor and personnel.

It's important for companies such as Eskom to measure and evaluate the performance of its business process. The solution to achieve a sustainable quality performance is by applying accurate quality methods and instruments in place. Successful quality implementation enhances customer satisfactions, provides precise products or services at the right time, price, place, and with good quality. The effective application, utilisation and implementation of quality techniques will assist more companies to accomplish their quality goals and objectives and lastly see tremendous growth rate in their business.

The next chapter is the summary of the research study which will cover the following concepts; achievement of research objectives, limitations, delimitations, important points of the analysis, and the benefits of the research study.



CHAPTER 6: SUMMARY

6.1. Introduction

This chapter present a brief summary of the research which focused on the objectives being met, limitations, delimitations, and advantages of the study.

6.2. Objectives Attainment

Main objectives of this study were to:

- Inspect whether Eskom has an effective quality department;
- Examine that quality is planned and controlled in this company;
- Inspect that employees know quality objectives and goals of the company;
- Explore Eskom commitment towards accomplishing quality efficiency and continuous improvement;
- Investigate whether Eskom management ensures that the customers are satisfied with the services provided

The objectives of this research study were accomplished, as most of the respondents gave their opinion on quality efficiency and some felt that the company was not doing enough to raise quality awareness, provide integrated training program, utilize and implement quality techniques. Most of the workforce felt that the management did not involve them in quality planning and sustainability of continuous improvement. Further, the findings suggest that a small percentage of employees did not know what quality efficiency was all about. The majority of employees felt that the organisation was doing less work to equip and empower them on customer relation and satisfaction. The involvement of employees in customers' relation activities will help employees know what customers' requirements are and how to achieve them.

6.3. Study Limitations

The challenge that the researcher faced was sample size, time constraints relating to distributing and collecting questionnaires to and from the participants, convincing participants to complete the survey and return them. The majority of the participants

work shifts and some of management and engineers were not available due to attending meetings and training. It is unsafe to willingly take for granted that an individual's answer is consistent and legitimate display of a company level of great performance.

During the research procedure there were various constraints that the researcher came across which disturbed the achievement of required outcomes. Out of hundred issued questionnaires, sixty completed questionnaires were returned and analyzed, twenty were spoiled and ten were not completed and the remaining ten were not returned. In addition to the limitations, this kind of research study requires extended time frame to generate sufficient information.

6.4. Delimitations

The study mainly focused on the quality department and did not include other divisions of the company, department have executed successfully quality efficiency goals and if the departments were working together there would be a better information gained. Improved technology which is emailing played significant function in getting participants to undertake the questionnaires and assisted with saving time as this was a quicker way to acquire responses.

The scope of this research was projected to provide employees of Eskom with high understanding of achieving quality efficiency and maintain or sustain continuous improvement. The quality management system assists in maintaining quality of product outcome. The function of the research was not to create a structure for a comprehensive quality efficiency revolution. Well extended methodology will focus on the imagining, recognizing and evaluating of poor quality which affects electricity operations and failing to meet customers' requirements.

6.5. Important points of the analysis

Majority of participants know and understand what quality is all about. Participants know the function of quality department and implications of failing to plan quality which results in poor quality products. It seems like the workforce does not know what are their quality responsibilities and they are not involved in the formulating of quality goals and objectives. Employees believe that quality should be planned, evaluated, and monitored in every step of their business processes which assist the company to be more commercial and reduce poor quality associated cost. Employee involvement is important to every quality efforts. Appropriate managing of quality is observed as an approach to increase performance and profits.

Quality department of any company should be responsible for conducting and planning integrated quality training sessions which are effective and beneficial to employees. The management and employees are responsible for looking for opportunities that improve quality efficiency in general and enhance continuous improvement. It is imperative for employees to know their external customers and continuously produce good quality products and services that will assist company to attractive more customers and gain competitive advantage. Companies have to develop and establish complaints mechanism which records customer's complaints. These will improve quality efficiency and satisfy customer's needs.

6.6. Benefits of the study

The benefit of this study is helping the company explore and embark on fundamentals of quality efficiency and highlight importance of quality improvement by manufacturing industries. Those companies that haven't started with quality infrastructure should begin doing so because quality is a global weapon that makes firms to be competitive and strive for achieving excellence, efficiency and effectiveness in their quality processes.

The study will enlighten, motivate and empower companies to construct, maintain relationships by anticipating, assessing, and satisfying mentioned customers quality requirements. These will make companies again competitive advantage and to continuously search for more effective and efficient quality methods that will improve and sustain their business processes. This study will facilitate companies to formulate processes that manage and improve quality of their products or services rendered to customers. The effective application, utilisation and implementation of quality techniques will assist more companies to accomplish their quality goals and objectives and lastly perceive tremendous growth rate in their business.



CHAPTER 7: REFERENCE LIST

7.1. Reference List

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CHAPTER 8: APPENDIX

8.1. ANNEXURE A: QUESTIONNAIRE COVER LETTER



701Westmorland
40-Oriellystreet
Berea 2198
28 April 2014

Dear Respondent

I am Vinny Motjoadi and currently studying MPhil (Masters Degree) in Engineering Management at University of Johannesburg. I am commissioning a research project to discover how quality efficiency is been developed and improved while sustaining continuous improvement in South African energy industry.

To this end I kindly request that you take few moments to complete the attached undersized questionnaire concerning your experiences in your unit, relating to quality efficiency and how it is developed and improved and continuous improvement being sustained. The questionnaire should not take longer to complete. Each research sub-questions have about ten questions so the questionnaire consists of fifty short questions and sixty five short interview questions and lastly with observation sheet.

Your response and participation is of paramount significance to the completion of this research study and it will enable me to complete my master degree in engineering management. Information provided by you will remain confidential. I would like to thank everyone in advance for your time, willingness to participate and provide honest answers.

Kindly return completed questionnaires to me not later than 30 April 2014. Should you have any uncertainty or comments concerning this questionnaire, please do not hesitate to contact me on 011 559 6849/073 085 3115 or e-mail me on

vinnym@uj.ac.za

Yours sincerely
Motjoadi Vinny

8.2. ANNEXURE B: RESEARCH QUESTIONNAIRES

In this study we are interested in your observations of quality efficiency related to issues and sustainability of quality continuous improvement. Please complete honestly the following questions by crossing with (X) in the relevant block. Your feedback will be confidential.

Section A: Background information

1. What is your highest educational qualification?

Grade 12	
Certificate	
Diploma	
Bachelor's degree	
Post-graduate degree	

2. How long have you been working in this field?

1 Year	
2 Years	
3 Years	
4 Years	
5 Years	
6 Years or more	

3. Which position or job title best describes yours?

Unit Operators	
Supervisors	
Technicians	
Artisans	

Buyers and Draughtsman	
Engineers	
Unit Managers	
Others (Specify)	

Section B: This section covers quality efficiency performance in the workplace. This section concerns your knowledge on quality efficiency. Please score relevant block with (X):

RQ 1: Does Eskom have an effective quality department?

No	Questions	Yes	No
1	Is there a quality department in this unit?		
2	Is management committed to attaining quality efficiency?		
3	Employees have a good understanding of what practical quality definition is?		
4	Do employees support and participate in quality initiatives?		
5	Does the organisation use quality circles?		
6	Does this organisation make every effort for zero defects?		
7	The department use quality tools to improve their processes?		
8	The department need to train employees on quality principles and philosophies?		
9	Quality leadership is essential to quality efficiency in this unit?		

10	Personnel know their quality responsibilities?		
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RQ 2: Is quality planned and controlled in this company?

No	Questions	Yes	No
1	Is quality planned, monitored and evaluated across the company's departments?		
2	Do employees understand the implications of poor quality planning?		
3	Is there exiting quality procedure in place?		
4	Is quality managed through collaboration?		
5	Are there measures used to evaluate quality performance of the unit?		
6	Are quality plans being re-examined and carried out on a regular basis?		
7	Do employees know, understand and practise quality policies?		
8	Do employees know the different between strategic and operational quality planning?		
9	Is quality planning steps outlined to employees?		
10	Are quality risks recognised?		

RQ 3: Do employees know Eskom quality objectives and goals?

No	Questions	Yes	No
1	Are quality goals and objectives clearly defined?		
2	Are departmental quality objectives and goals aligned with one of entire Eskom?		
3	Do employees get involved in engineering quality activities?		
4	Does the top management pledges and participates in quality performance?		
5	Do employees know the effective use of quality management system (QMS)?		
6	Does management disperse quality objectives to all employees?		
7	Are employees allowed to provide their viewpoints on quality management?		
8	Is there implemented system for attaining the objectives and goals structured efficiently?		
9	Quality tools are used effectively?		
10	Is there comprehensible relationship between key objectives, organisational goals and quality activities?		

RQ 4: Is Eskom committed towards accomplishing quality efficiency and continuous improvement?

No	Questions	Yes	No
1	Are leaders committed to quality efficiency and continuous improvement (CI) sustainability?		
2	Is quality efficiency measured?		
3	Does Eskom frequently develop effectiveness and efficiency of entire quality processes?		
4	Do quality techniques utilised in sustaining continuous improvement (CI)?		
5	Is quality training conducted as it improves and sharpens employees' skills to perform better?		
6	Is quality management system (QMS) utilised effectively as it is a tool that enables companies to maintain control, and create stability, predictability and capability?		
7	Is inspection performed?		
8	Are all quality tasks and processes standardised because they improve quality efficiency and sustain continuous improvement (CI)?		
9	Is there effective and efficient quality implementation structure in place?		
10	Is there full support during quality improvement implementation?		

RQ 5: Does Eskom management ensure customers are satisfied with services provided?

No	Questions	Yes	No
1	Are products possess attributes of customer's expectations?		
2	Do Eskom allow customers to be involved in designing product quality?		
3	Do employees get involved in customer relation activities and be trained on the concept?		
4	Are customer needs made known to employees, and product-related value perfectly considered through externalities components?		
5	Is customer satisfaction measured within your organisation?		
6	Are customers significant for the sustainability of the business?		
7	Does Eskom aggressively and frequently look for customer's contribution to recognize their expectations and needs?		
8	Does Eskom understand customers as it is key to quality management efforts?		
9	Does customer complaints considered as utmost important input that assist with improving processes?		
10	Are customers requirements successfully circulated and understood throughout personnel?		

8.3. ANNEXURE C: SHORT INTERVIEW QUESTIONS

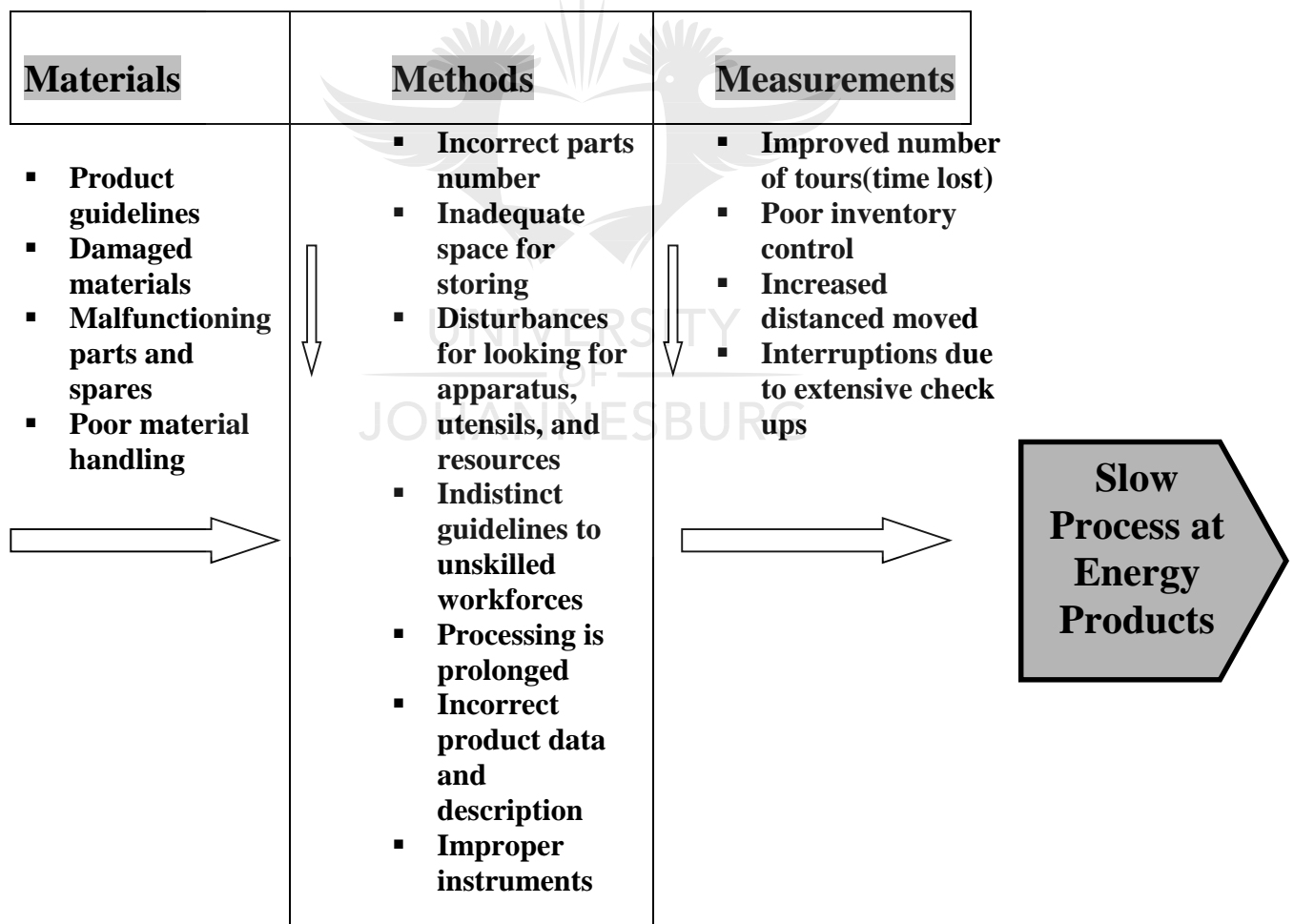
The interviews will be conducted on the 29 April 2014 at 10h00. The following interview questions were utilized to acquire quality understanding and opinions from employees and management at the Electricity Generation Unit (EGU) in Eskom, and its impact in the business of the company:

- Do you understand what quality is all about?
- Are your department quality objectives and goals clearly defined?
- Are employees encouraged to participate in quality activities?
- Does Eskom have a quality culture?
- Are employees rewarded and recognised for their better performance?
- What do you understand about the quality vision and mission of Eskom quality department?
- Do you think homogenizing quality policies across the departments might have positive impact on quality goods supplied?
- Is quality training provided to those employees who struggle to understand their quality roles?
- Do you take great pride in what you do?
- Do you know customers' requirements and expectations?
- What are improvement techniques your department is utilising?
- How does your management describe quality efficiency?
- Is your management committed to continuous improvement?

- How do you sustain continuous improvement as Electricity Generation Unit (EGU) team?
- Do you know the role of customers in your department?

8.4. ANNEXURE D: OBSERVATION SHEET

The observation sheet is used to acquire an understanding of the constraints or problems that employees in Electricity Generation Unit (EGU) encounter on their daily operation. The problems will be recorded on the observation sheet and fish-bone diagram (cause-and-effect diagram) will be utilized to analyze them. Record below:



<ul style="list-style-type: none"> ▪ Lack of skills and motivation ▪ Incompetence to carry out activities at particular periods ▪ Poor decision making ▪ Employees do not follow orders ▪ Lack of enthusiasm to apply new functioning methods ▪ Organisation functioning 24hours results in exhaustion 	<div style="text-align: center;">↑</div> <ul style="list-style-type: none"> ▪ Old equipments ends in regular breakdown ▪ Regular apparatus or machine breakdown ▪ New employees find it difficult to operate automatic machines ▪ Malfunctioning products 	<div style="text-align: center;">↑</div> <ul style="list-style-type: none"> ▪ Bad working environment ▪ Contaminated air ▪ Poor facility design ▪ Noise and Vibration ▪ Hazardous steam and hot processed water exposed
Manpower	Machine	Mother nature (Environment)

Table 3: Cause-and-effect diagram