**UNIVERSITY OF KWAZULU-NATAL**

# THE PERCEPTIONS OF ISO 9001 IMPLEMENTATION IN SELECTED CONSULTING ENGINEERING FIRMS IN DURBAN

**By**

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# ABSTRACT

Total Quality Management is an overarching philosophy aimed at the improvement of all facets of an organisation's resources and processes. Quality Management Systems such as the ISO 9000 family of standards seek to improve the quality of products and services whilst providing customer satisfaction. Tools such as the ISO 9001 certification allow organisations to compete on an international stage where they are judged by a set of common standards. Most ISO 9001 certifications are currently associated with manufacturing sector with a small percentage reflecting certification in the engineering services sector. An exploratory research is required in determining the impact of factors linked with implementing ISO 9001 standard and certification in the consulting engineering sector of firms located in the Durban area. The research determines the potential benefits and pitfalls of implementing the ISO standard amongst consulting engineering firms by gathering primary data through questionnaires and secondary data by way of literature and empirical reviews. A mixed methodology was adopted for the data collected from the respondents. The research looked at common threads of themes that feed into the implementation of the ISO 9001 standard amongst consulting engineering firms drawn from a list of firms belonging to various engineering associations. This was compared to themes found in current literature associated with ISO 9001 certification implementation. Themes related to performance, quality improvement and customer satisfaction were identified and the barriers to implementation such as lack of management buy-in, training and costs were also identified. Further analysis thereof determined trends and lessons that can advise future and present ISO 9001 certified consulting engineering firms in their implementation of the standard and subsequent sustainability issues. Recommendations included ensuring management support, continual staff training, acquiring specific staff for ISO purposes and appropriate record keeping. Future studies into the research could expand the size and scope to include employees and thereby add more insight into the implementation of ISO 9001 standard amongst consulting engineering firms in Durban.

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# CHAPTER ONE: INTRODUCTION TO THE RESEARCH

## 1.1 Introduction

Managers in business are faced with the task of producing quality services and products to their customers in a competitive market place. As such a functional management strategy aimed at improving the quality of an organisation's products and services known as Total Quality Management (TQM) (Jones and George, 2013) that directs all the organisation's value chain activities to this goal. As part of this approach, managers use quality management tools such as ISO 9000 to ensure that quality is continually being improved when it comes to the production of goods and services (Summers 2009). The implementation of these tools should see an increase in quality, performance and potential benefits as the organisation seeks to get competitive advantage in its market space. Businesses therefore need to identify the benefits and challenges faced with using quality management tools and to understand what will be required of them if they choose to use them in their business operations. This research is aimed at determining the perceived benefits and challenges in implementing the ISO 9001 standards as experienced by selected consulting engineering firms in Durban and this chapter represents an overview of the research.

This chapter presents a background to the ISO 9001 standard as a link to the focus of the study that informs the problem statement that this research aims to answer. The chapter goes on to describe the research objectives and how these were investigated by detailing the research methodology, limitations and delimitations that affect the research. A brief chapter outline charts the contents of the various sections that make up this study.

## 1.2 Background to the Study

The International Organisation for Standardization (ISO) has developed the ISO 9000 group of standards to include standards that set out the requirements, concepts, vocabulary, efficiency, effectiveness and audit requirements for a quality management system (ISO 9000, 2016). The purpose of the ISO standards in general is to allow for the exchange of products and services across regions by establishing an unambiguous set of quality system requirements (Summers, 2009). This also establishes a baseline from which an organisation's quality system can be assessed. This allows the organisation to be judged on an equal footing by both customers and competitors in a local and international context.

ISO as an organisation has over one million organisations in over 170 countries that are certified to ISO 9001 standards (iso.org, 2016a). According to ISO, the leading African country when it comes to IS0 9001 certification is South Africa (iso.org, 2016c). This ideally would give South African firms a competitive advantage on the continent in terms of delivering quality products and services to customers in alignment with TQM principles. The majority of the ISO 9001 certifications in South Africa belong to the manufacturing sector and allied service industries (iso.org, 2016c). ISO 9001 certifications in the Engineering sector, account for approximately 4.6% of total certifications by industry sectors. As such, an initial search of academic resources has a proportionately small focus on engineering related firms and issues linked with ISO 9001 standards certification.

### 1.3 Focus of the Study

The scope of the research is focused on selected consulting engineering firms in Durban and their adoption of quality management tools in particular the ISO 9001 Quality Management tool and certification process. The selected consulting firms are members of the Consulting Engineers of South Africa (CESA) and encompass the engineering disciplines found in the Durban region. CESA is an important voluntary organisation whose members are consulting engineers. CESA has a specific code of conduct and member requirements and this importantly includes the requirement for members to be ISO 9001 certified (CESA, 2016). The certification process and subsequent maintenance of the standards are the chief areas of concern of the research. The perceived and expected benefits were explored as well. Potential pitfalls and barriers are also to be identified so that this may be added to the body of knowledge.

### 1.4 Significance of Study

The knowledge provided should assist consulting engineering firms in future implementation of the ISO 9001 standard in their organisation's processes as they seek to apply total quality management strategies. This should directly benefit the managers and staff of such firms. It should also benefit ISO auditors refine their rulings and advice to these firms. This information should also help the decision making process for firms contemplating using the ISO standard for the first time.

## 1.5 Problem Statement

The use of quality management tools is widespread across many manufacturing and service industries worldwide. However, the adoption of these tools in the engineering sector is limited in comparison to the manufacturing and service industries, and hence the knowledge available to members of this sector may be limited. The experiences of consulting engineering firms in implementing a quality management tool such as ISO 9001 need to be documented to understand its application in the South African context. Thus, the problem that was researched investigated the perceived benefits and challenges in applying the ISO 9001 standard to consulting engineering firms located in the Durban area. A mixed methods methodology was used in the data collection process for this study.

## 1.6 Research Objectives

In response to the problem statement the study is to achieve the following research objectives to determine:

- The perceived benefits expected by consulting engineering firms when they implement and obtain ISO 9001 certification.
- The challenges that consulting engineering firms experience in obtaining, implementing and sustaining the ISO 9001 certification.
- If the ISO 9001 standard is being implemented effectively amongst the selected firms.
- The lessons that can be learned from the ISO 9001 certification process in the consulting engineering industry in Durban and how do these compare to other firms in other parts of the world.

This was carried out through a literature review, field study and analysis and summary of the research tool's findings. Conclusions are drawn from the fieldwork and recommendations are also presented.

## 1.7 Methodology

This study addresses the perceived benefits and challenges faced by consulting engineering companies in their implementation of the ISO 9001 quality management tool. The purpose of this study is to identify the issues relating to the factors associated with ISO 9001 implementation and certification by collecting answers to surveys from quality managers from the various Durban based consulting engineering firms. The survey research instrument has qualitative and quantitative elements to it which can be identified clearly and measured

across the various firms. This is compared against existing similar information found in the literature review, on the implementation of the quality system and conclusions and recommendations can be drawn thereof.

### 1.8 Limitations of the Study

The research was a self-funded small-scale study that was limited by the resources available in terms of cost and time. The study was conducted over a 5-month period that restricted the size of the study to what was practically achievable in the allocated time. Conducting the study over a longer period could have produced more insights into the research. Another limitation was that some potential participants were not able to participate as they were too busy with their business responsibilities thereby reducing the available population of respondents for the sample size.

### 1.9 Delimitations of the Study

The study was limited to firms within the Durban area due to ease of accessibility to the participants.

The research has identified that the ISO 9001 standard has been recently updated from its ISO 9001:2008 version to the ISO 9001:2015 revision. It is therefore expected that firms underwent a transitional stage as they moved from one version to the other. This study did not look at the changes during this transition but looked at the status quo of the different firms based on the certification they had currently obtained.

The study did not focus on the certification bodies that certify whether a firm is compliant or not compliant to the ISO 9001 standard. The certification bodies may not be at liberty to disclose the number of firms that comply or not comply with the standard. However, these bodies may offer some insight into the motivation that firms have when applying for the ISO 9001 standard certification and this could be another avenue of research topic.

The firms surveyed, belong to the voluntary professional body CESA, through relevant experience understand the implications and guidelines associated with the ISO 9001 standard. It is expected that firms were not be transitioning or learning about the standard.

## 1.10 Chapter Outline of the Study

**Chapter One: Introduction**

Chapter one introduces the field of this study by providing a brief description of the problem, the objectives and the questions that the study attempts to answer. The delimitations of the study are also presented to give a clearer understanding of the scope of the study.

**Chapter Two: Literature Review**

Chapter two consists of review of previous literature, both theoretical and empirical, that inform the issues associated with the study objectives.

**Chapter Three: Research Methodology**

Chapter three introduces the research methodology and the adopted research approach and design. In this chapter the sampling method, data collection, research instrument design and conceptual framework for the study are presented.

**Chapter Four: Results**

Chapter four presents the results of the study by means of relevant graphs and tables.

**Chapter Five: Discussion of Results**

Chapter five presents a discussion of the findings of the study. The findings are the analysis of the data presented in chapter four and their relationship with the research objectives.

**Chapter Six: Conclusions and Recommendations**

Chapter six correlates the research objectives with the findings by way of the conclusion. The implications of the research on current stakeholders are presented along with recommendations that emanate from the research. Recommendations for future studies to overcome some identified shortcomings of the research.

## 1.11 Chapter Summary

The research study considered the factors associated with the implementation of ISO 9001 certification in selected consulting engineering firms in the Durban area. The ISO 9001 standard being introduced and given a context in terms of its background. A problem statement has been presented along with objectives that the research answers via the chosen methodology. It has been noted that the study has its limits and delimitations that create boundary conditions for the scope of the research. A brief outline of the content of the chapters in the study has been presented. In the next chapter, a literature review of some theoretical and empirical research is presented as means to provide an explanation of the framework upon which the study is built on.

# CHAPTER TWO: LITERATURE REVIEW

## 2.1 Introduction

The literature review presented examines the foundational ideas and normative theories that form the total quality management and the ISO standards' structure and principles. The literature review initially examines the historical and theoretical framework that informs this research and then expounds on a review of the relevant empirical literature. The literature review is not limited geographically to South Africa but also considers resources from global sources and across various industries.

## 2.2 Historical Review

The history of the ISO is a 70-year long journey of change management, expansion and continual improvement. Much of the literature on its development is anecdotal consisting of interviews of long serving ISO members, comments from other standardisation organisations such as the British Standards Institution (BSI), historical articles and textbook citations (ISO, 1997; Hoyle, 2001; British Assessment Bureau, 2017). The standards created by ISO are well documented by the organisation itself. This section presents a historical snapshot of standards through the ages, the formation of ISO as well as a background to the formation of the ISO 9000 series of standards.

In commemoration of 50 years of the ISO standards, ISO (1997) compiled a collection of iconic stories of seven employees of ISO over the 50 years. The book for example describes the early formation of ISO from the experiences of Willy Kurt. Kurt remained one of the only surviving delegates that attended the London conference in October 1946 where ISO was first established. ISO was established from the merging of two organisations; the ISA (International Federation of the National Standardizing Associations), founded in New York in 1926, and administered from Switzerland. While the other organisation was the UNSCC (United Nations Standards Coordinating Committee).

The following two sections thus look at a historical progression of standardisation and the history of the International Organisation for Standardisation (ISO).

### 2.2.1 Historical Progression of Standards Formation

*To trace the history of standards formation, the prominent ISO standards author Hoyle (2001) and the ISO website repository of information were used. Other sources of available information were Manders, B (2014) and The British Assessment Bureau (2017).*

The history of ISO can be linked to the progression of human development, innovation and the need to check on products and services that were produced. The checking or inspection of items against standards can be traced back to 3000 BC in Egypt where Imhotep, an architect of the pyramids is believed to have initiated standards for the pyramids' cut stones to ensure they were uniform using wooden gauges for measurement. The development of written language by the Sumerians in 3100 BC saw the documentation of practices mainly in business and administrative settings. From the third century AD, through to the eleventh century AD, through the Roman Empire (300 BC), Byzantine Empire (1000 BC) and Europe (1100BC), craftsmen, traders and merchants formed guilds for mutual aid, protection and the furtherance of their professional interests. These guilds monopolised trade, set standards of quality for their goods and trading practices. They evolved to control distribution and sale of various goods, and even imposed tariffs on foreign merchants who wanted to trade in local markets. The guild system was not limited to Europe but could be found in the Islamic world, China, India and Japan. However, by the 16$^{th}$ century the guild system was in decline due to the rise of regulated companies and wealthy merchant-capitalists' associations. In the 18$^{th}$ century the rise of specialist workers during the Industrial Revolution, the result of Adam Smith's theories of division of labour, where work was broken down into simpler tasks and each task assigned to specialist led to the rise of quality inspectors. In the early 1900's Frederick W Taylor introduced the concepts of managing work as a system and that workers and management need not be adversaries but partners in the system of work. In 1916 Henri Fayol's management theory of separating work into functions, e.g. technical functions and administrative functions, saw a move to separating the planning, organisation and controlling of work from the actual performing of work. This was a precursor to the manager employee relationship based on functional assignments that is the basis of many present day organisations. The outbreak of the First World War in 1914 led to the growth of inspectors of armaments. The British government established a Ministry of Munitions to coordinate the production of armaments that later led to the establishment of standards of products supplied to the military. After World War 2, the prerequisite certification of suppliers wishing to do business with the military was a critical issue. The organisation's quality and the standard of its product became part and parcel of standardisation requirements as evidenced by the

introduction of the first national military standard, MIL-Q-9858, by the American Department of Defence. The requirements for corrective action, preventive action, data analysis, improvement, work instructions, records, document control and others all formed part of this document. This was a forerunner of the NATO Allied Quality Assurance Publications (AQAPS) that also implemented requirements for contractual suppliers' organisational quality. Suppliers not registered to defence standards were simply not invited to tender for work unless they passed the military's quality assurance standards. In In 1975, Canada developed and publish the first quality system standards for commercial (non-military) use namely the Canadian Standards Association's Z299 series. In 1979, the BSI published the BS5750 for contractual purposes, that was born of 3 UK Defence Standards and 3 AQAP standards. This British standard also put pressure on suppliers to seek BS5750 certification lest they be removed from lists of approved suppliers to the military. In 1984 BSI revised BS 5750 and due to the increased international interest in standardisation encouraged ISO to create an International Standard for Quality Systems. ISO 9000 was published in 1987 as a set of six standards all bearing a strong resemblance to the BS 5750 family of standards. Over 26 countries were involved in its development and each country connected with its development then brought out a national equivalent.

### 2.2.2 History of International Organisation of Standards (ISO)

*To trace the history of ISO, the prominent ISO standards author Hoyle (2001) and the ISO website repository of information was used. Other sources of available information were ISO (1997) and The British Assessment Bureau (2017).*

By the time of the development of the Canadian standards, the International Organisation of Standards (ISO) as an organisation had been running on a parallel trajectory since 1946 creating and issuing documents amongst its members and the nations they belonged to. ISO was formed by the merger of two organisations. The one was the International Federation of the National Standardizing Associations (ISA), administered in Switzerland but established in New York in 1926. The other was United Nations Standards Coordinating Committee (UNSCC), established and administered in London from 1944. The UNSCC was founded by the United States, Great Britain and Canada to spread the advantages of standardisation on the Second World War effort and the reconstruction work to come. On the 14th October 1946, at the Institute of Civil Engineers in London a conference representing 25 countries came to order. At the end of proceedings of the conference, the UNSCC and ISA dissolved their organisations and ISO as an organisation was formed with agreements on the name of

the organization, the location of the Central Secretariat and the official languages to be adopted having been finalised. The seat of the organisation was chosen by majority vote of one to be Geneva. By the early 1950s ISO's technical committees (groups of experts focusing on a specific subject) were producing "Recommendation" documents that were meant to influence existing national standards and were not at the time considered as international standards for business. About 100 recommendations were published in the 1950s and approximately 1400 recommendations were published in the 1960s. During the 1960s ISO worked to include more developing countries in its work. In 1961, it established a committee for developing country matters known as DEVCO. During the 1970s ISO focused its efforts on becoming a truly international organisation and not just a European based organisation that happened to have international members by doing practical things like visiting member's countries. This led to active participation by countries such as Australia, China and Japan. This change was also shown in ISO's Central Secretariat as it now had 25 different nationalities represented in its governing body. The publication of the ISO 9000 set of international standards in 1987 set the organisation on an incremental growth path in terms of its reach. Its standards moved from being just used in the manufacturing sector to the service sector; used by schools, healthcare, agriculture, professions and transport entities. Worldwide by 1993 there were 27000 ISO 9001 certifications, by 1997 there were 274040 ISO 9001 certifications and by 2013 more than 1 million certificates had been issued to 187 countries.

## 2.3 Theoretical Review

### 2.3.1 Quality Management System

The word quality has various connotations. In order to provide a definition of quality for the purposes of this research, Hoyle (2001) mentions the following meanings associated with quality:

- A degree of excellence
- Freedom from defects, imperfections or contamination
- Conformance with requirements
- Delighting customers
- The totality of characteristics of an entity that bear on its ability to satisfy stated or implied needs
- Fitness for purpose
- Fitness for use

Hoyle (2001) further summarises the ISO 9000 quality definition as, "The degree to which a set of inherent characteristics fulfils a need or expectation that is stated, general implied or obligatory."

The idea of quality is rooted in meeting customer expectations and maintaining an upward trajectory of customer confidence and the important benefit to business bottom line or profitability that this yield. The management of quality has historically developed through measures, standardisation and specification (Geotsch and Davis, 2010).

Total quality management is an extension of the benchmarks of quality products to include quality processes and resources that results in quality products. Jones and George (2013: 274) define TQM as a "focus on improving the quality of an organization's products and stresses that all of organisations value chain activities should be directed towards this goal". Total quality management is the overarching functional strategy that underpins an organisational pursuit of quality in service, products or processes.

The guiding principles or elements of TQM are elaborated in several books (Bhat and Navya, 2014; Geotsch and Davis, 2010; Jones and George, 2013; Munro Ramu and Zrymiak., 2015b). Furthermore, the pioneers of the TQM normative theory is rooted in a post-World War II context specifically Japan, led by W. Edwards Deming and several other contributors

(Cartin, 1999; Geotsch and Davis, 2010). TQM is essentially a confluence of principles constructed by Deming and Kaoru Ishikawa, attributing the adoption of TQM for the quality centred success that is Japan's industrial development (Bender and Krasnick, 1993). Through the decades, the elements of these principles which are reflected in other popular management systems such as ISO 9001 and Six Sigma, another popular management system, are summarised by Jones and George (2014:275) in terms of these 10 steps:

- Build organisational commitment to quality,
- Focus on the customer,
- Find ways to measure quality,
- Set goals and create incentives,
- Solicit input from employees,
- Identify defects and trace them to their source,
- Introduce just in time inventory systems,
- Work closely with suppliers,
- Design for ease of production,
- Break down barriers between functions.

However, into the 21st century and beyond quality management focus and trends shaping the present and future may include the following as described by Geotsch and Davis (2010: 21):

- Increasing global competition,
- Increasing customer expectations to include the quality of the organisation and not just the quality of the product,
- Opposing economic pressures that create conflicting low pricing pressures for higher quality,
- New approaches to management and organisational management with a focus on leading people and managing budget; and not *vice versa*.

In support of similar and more contemporary quality management principles, Hoyle (2013: 9) expounds on these as follows and as further illustrated in Figure 2.1 as follows:

- Understanding customer needs and expectations, i.e., a customer focus;
- Creating a unity of purpose and a quality culture, i.e., leadership;
- Developing and motivating the people, i.e., involvement of people;
- Managing processes effectively, i.e., the process approach;

- Understanding interactions and interdependencies, i.e., the systems approach;
- Continually seeking better ways of doing things, i.e., continual improvement;
- Basing decisions on facts, i.e., the factual approach;
- Realizing that you need others to succeed, i.e. mutual beneficial relationships.

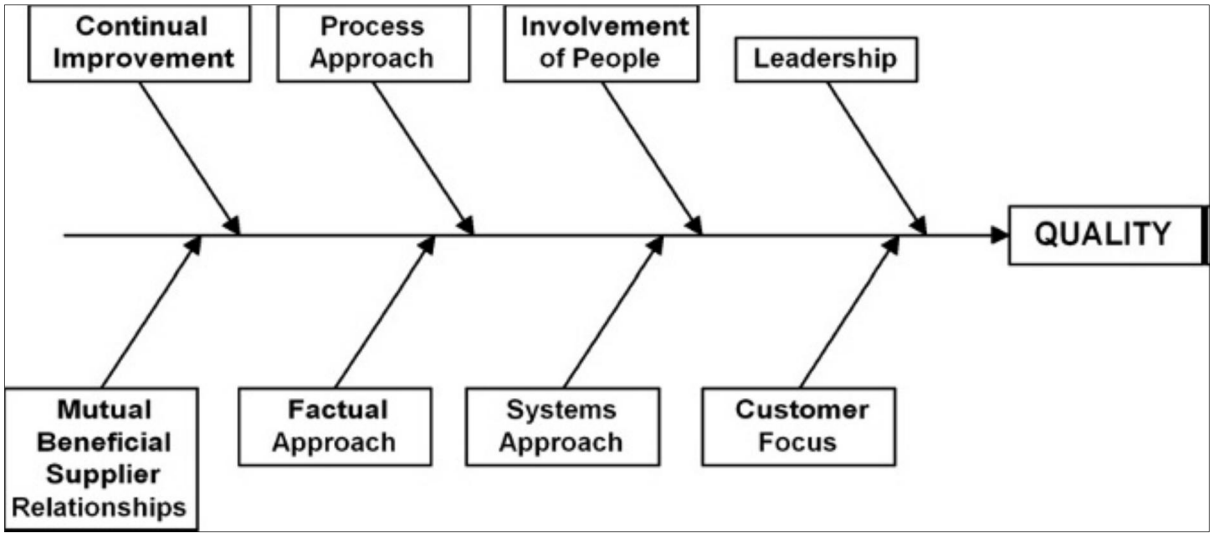


Figure 2.1: Quality Management Principles
Adapted from Hoyle, D. (2013). ISO 9000 Quality Systems Handbook: Using the standards as a framework for business improvement, NY: Routledge, p8.

According to Hoyle (2013:9) the eight factors of quality management principles represent the causes of quality. Failure to manage any one of these factors will lead to a failure in quality in the organisation.

Berger (2009) states that other benefits of a quality management tool such as ISO 9001 are as follows:

- Facilitates interdepartmental communication: different organisational functions can come together on common issues.
- Creates synergy between different departments by having a central forum for planning and improvement.
- Serves as a diagnostic tool that maps the various processes in an organisation and the gaps that may exist between those processes.
- Dynamic drafting of the QMS to suit the organisation and not the other way around.
- Education and training of all employees in their various functions.
- Continuous improvement

### 2.3.2 ISO 9000 Quality Management System

ISO 9000 is a family of standards dedicated to quality management processes to ensure a level of consistent and comparable quality of products and services. ISO 9001 aims to enable the voluntary implementation of a quality management system that espouses both specific management and assurance requirements (iso.org, 2016a). ISO 9001 has reached global popularity where in 2013, over one million certificates to the standard were issued across 187 countries (Geotsch and Davis, 2010:336; iso.org, 2016). According to ISO (iso.org, 2016a), the ISO 9000 series consists of the following documents:

ISO 9000:2015 - covers the basic concepts and vocabulary
ISO 9001:2015 - sets out the requirements of a quality management system
ISO 9004:2009 - focuses on how to make a quality management system more efficient and effective
ISO 19011:2011 - sets out guidance on internal and external audits of quality management systems.

ISO 9001 is the only standard in this series to which organisations are certified or registered with, upon implementing third party auditing of an implemented quality management system compliant with this standard (Geotsch & Davis, 2010). Furthermore, ISO 9001 is a set of specific requirements in order to implement a quality management system. However, these standards are constantly updated or changed.

If ISO 9001 were to be resolved into a single requirement it would be phrased along the following lines (Hoyle, 2001):
"The organization shall determine what it needs to do to satisfy its customers, establish a system to accomplish its objectives and measure, review and continually improve its performance"

### 2.3.3 ISO 9001 Updated Revision

The ISO standards' review process necessitates revisions as is the case since the launch of the revised ISO 9001:2015 standard. There are a several academic literature contributors to the understanding the ISO 9001: 2015 revisions (Cianfrani and West, 2015; Seear, 2015; Tricker, 2015). According to ISO (iso.org, 2016) the main changes in the 2015 revision relates to two main concepts i.e. the standard's structure and the introduction of risk-based thinking. The

former specifically relates to increased conformity with other ISO standards, making ISO 9001 streamlined and compatible with other concurrent ISO management systems that organisations may also subscribe to. Risk based thinking (RBT) is a central concept in the ISO 9001: 2015 (iso.org, 2015). RBT prioritizes a preventative and integrated approach to risk and includes identifying risks and building in risk-averse strategies for managing risk. There are some authors that identify its importance as a more explicit risk approach (Munro *et al.*, 2015a), while others view it as an important but not altogether novel concept in ISO 9001 (Seear, 2014). However, Hutchins (2014) further highlights the risk context of business operations in the present global context as a VUCA context of Volatility, Uncertainty, Complexity, Ambiguity. This brings into perspective the need for a quality management system that can identify risks which in tandem highlights opportunities inherit in addressing and minimising these operational, process and administrative risks. A comparison of these differences is tabulated in Table 2.1 below.

Table 2.1: Differences between ISO 9001:2008 and ISO 900:2015 standards
Adapted from Praxiom. (2015a). *ISO 9001:2015: Plain English Outline.* Available: http://www.praxiom.com/iso-9001-outline.htm . (Accessed 20 July 2017).

| ISO 9001: 2008 | ISO 9001:2015 |
|---|---|
| 0. Introduction | 0. Introduction |
| 1. Scope | 1. Scope |
| 2. Normative References | 2. Normative References |
| 3. Terms and Definitions | 3. Terms and Definitions |
| 4. Quality Management System | 4. Context of the Organisation |
| 5. Management Responsibility | 5. Leadership |
| 6. Resource management | 6. Planning |
| 7. Product Realisation | 7. Support |
| 8. Measurement, Analysis and Improvement | 8. Operation |
| | 9. Performance Evaluation |
| | 10. Improvement |

As can be noted in Table 2.1 the first 3 sections of the standards are similar but from section 4, the standards differ. The difference in the versions shows that there is an increased focus on risk based management as discussed previously but also on the following (Paxiom, 2015b):

- Emphasis on leadership and organization context
- A reduced role for documentation
- Valuing an inclusive process to promote organization communication and awareness
- Importantly there is a focus on process flows and measuring of inputs and outputs similar to those shown in Figure 2.2

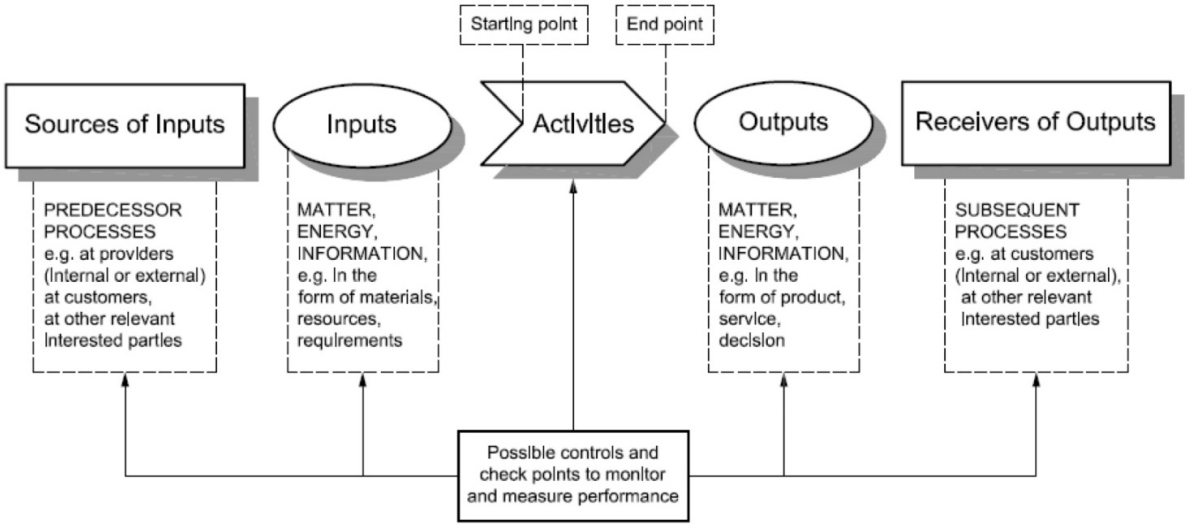


Figure 2.2: Process flows characteristics
Adapted from Praxiom. (2015). *ISO 9001:2015* Process flows. Available: http://www.praxiom.com/iso-9001-overview.htm. (Accessed 20 July 2017).

The measurement of inputs and outputs in process flows can assist in monitoring and performance measurement of the activities they are linked to.

However, while the changes in ISO are elaborated on, it is contextualized in transition timeframe to change to the new revision of the standards. Companies who have implemented the ISO 9001:2008 have three years from the time of the new revision to transition. Therefore by 2018 companies must transition to the new revision or else have their ISO 9001 certification invalidated (iso.org, 2016b). This being said, Seear (2014) asserts that the 2008

version is not yet redundant and purports its continuing efficacy to achieve the benefits of a quality management system.

### 2.3.4 Structure of ISO 9001 Standard

The ISO 9000 series has the ISO 9001 as a process based standard. ISO process standards are based on the management principles of Deming Cycle of Plan – Do- Check – Act namely:

- Plan - quality planning
- Do – quality steering
- Check - quality assurance
- Act – quality Improvement (Mata-Lima, da Silva, Alcantara & Almeida, 2016)

This cycle ensures continuous improvement of the system through a cyclical and iterative process as indicated in Figure 2.3

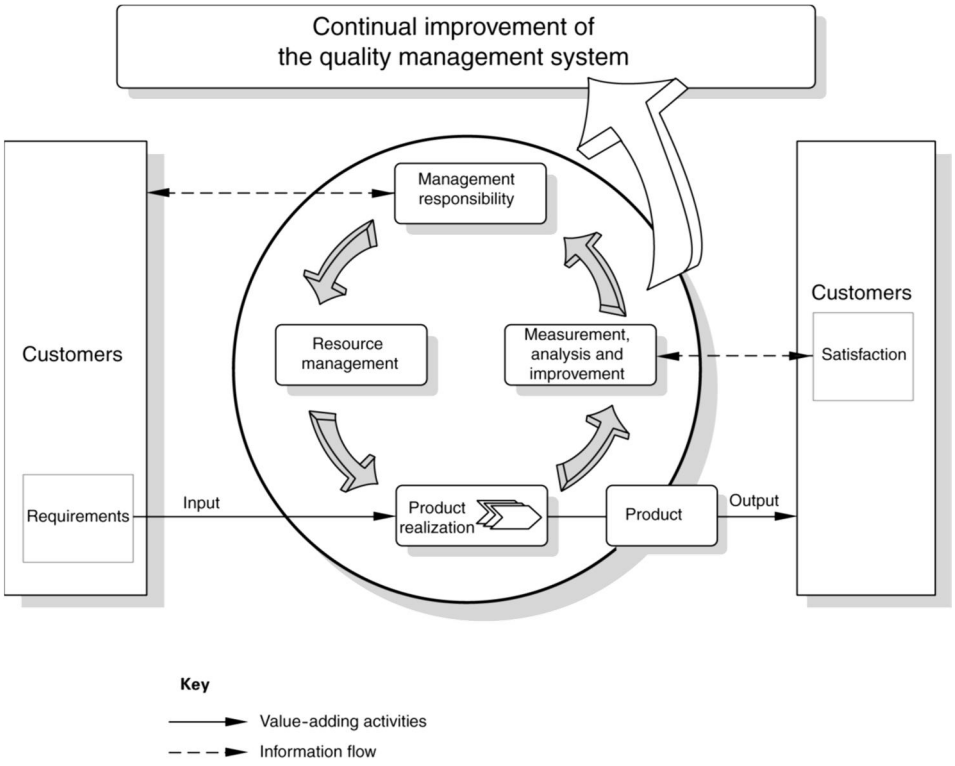


Figure 2.3: Continual Improvement of the Quality Management System
Adapted from ISO. (2008). *ISO 9001:2008 Quality Management Systems Requirements.* Fourth Edition. Geneva: ISO. p6.

According to ISO the continual cyclic improvement of a quality management system involves satisfying customer requirements through an iterative process of measurement, analysis, improvement, management responsibility and resource management.

However the operational principles of ISO 9001 are instilled from the quality management tradition from which it stems, specifically that of total quality management (Geotsch and Davis, 2010). According to ISO (iso.org, 2016b), the principles of the ISO 9001 are the foundation of its development and contain the following:

- Customer focus: Retaining customer confidence by meeting and exceeding their quality expectations.
- Leadership: A single vision guided by strong leadership that informs the organisation's members on what is going to be achieved.
- Engagement of people: Ensuring engaged, competent and empowered workforce exists within all the organisation's structures to create value for customers.
- Process approach: Understanding the processes, teams and people that link together for consistent quality outputs. Understanding the fit of the various organisation's activities so that efficiency is improved.
- Improvement: Continual improvement and adaptation to internal and external environmental changes is necessary for the delivery of value to customers.
- Evidence-based decision making: Seeking solutions based on analysing and evaluating available data.
- Relationship management: Identifying and managing important relationships with interested parties e.g. suppliers, to ensure long term success.

The ISO 9001 is structured around several requirements aimed at meeting both quality and assurance standards of customers and regulatory bodies (International Standards Organisation, 2008). These requirements present the structure of the ISO 9001 standard as follows:

- Documentation requirements
- Management Responsibility and commitment
- Resource Management
- Product Realization
- Measurement, Analysis and Improvement

However, this represents the outline of the previous version of ISO 9001:2008. The ISO 9001: 2015 version has the following structure and outline as tabulated in Table 2.2. The table details the specific areas of difference in the new standard. While it is not the aim to discuss each of seven standard components, it sufficient to note their composition and focus.

Table 2.2: Outline of ISO 9001:2015 standard's revised sections.
Adapted Praxiom. (2015a). ISO 9001:2015: Plain English Outline. Available: http://www.praxiom.com/iso-9001-outline.htm. (Accessed 20 July 2017).

| **ISO 9001: 2015 Outline** |
|---|
| **4. Context** |
| 4.1 Understand your organization and its unique context. |
| 4.2 Clarify the needs and expectations of interested parties. |
| 4.3 Define the scope of your quality management system. |
| 4.4 Develop a QMS and establish documented information. |
| 4.4.1 Establish a QMS that complies with this standard. |
| 4.4.2 Maintain QMS documents and retain QMS records. |
| **5. Leadership** |
| 5.1 Provide leadership by focusing on quality and customers. |
| 5.1.1 Provide leadership by encouraging a focus on quality. |
| 5.1.2 Provide leadership by encouraging a focus on customers. |
| 5.2 Provide leadership by establishing a suitable quality policy. |
| 5.2.1 Provide leadership by formulating your quality policy. |
| 5.2.2 Provide leadership by communicating your quality policy. |
| 5.3 Provide leadership by defining roles and responsibilities. |
| **6. Planning** |
| 6.1 Define actions to manage risks and address opportunities. |
| 6.1.1 Consider risks and opportunities when you plan your QMS. |
| 6.1.2 Plan how you're going to manage risks and opportunities. |
| 6.2 Set quality objectives and develop plans to achieve them. |
| 6.2.1 Establish quality objectives for all relevant areas. |
| 6.2.2 Develop plans to achieve objectives and evaluate results. |
| 6.3 Plan changes to your quality management system. |
| **7. Support** |

| ISO 9001: 2015 Outline |
| --- |
| 7.1 Support your QMS by providing the necessary resources. |
| 7.1.1 Provide internal and external resources for your QMS. |
| 7.1.2 Provide suitable people for your QMS and your processes. |
| 7.1.3 Provide the infrastructure that your processes must have. |
| 7.1.4 Provide the appropriate environment for your processes. |
| 7.1.5 Provide monitoring, measuring, and traceability resources. |
| 7.1.6 Provide knowledge to facilitate process operations. |
| 7.2 Support your QMS by ensuring that people are competent. |
| 7.3 Support your QMS by explaining how people can help. |
| 7.4 Support your QMS by managing your communications. |
| 7.5 Support your QMS by controlling documented information. |
| 7.5.1 Include the documented information that your QMS needs. |
| 7.5.2 Manage the creation and revision of documented information. |
| 7.5.3 Control the management and use of documented information. |
| 7.5.3.1 Control your organization's documents and records. |
| 7.5.3.2 Control how documents and records are controlled. |
| **8. Operations** |
| 8.1 Develop, implement, and control your operational processes. |
| 8.2 Determine and document product and service requirements. |
| 8.2.1 Communicate with customers and manage customer property. |
| 8.2.2 Clarify product and service requirements and capabilities. |
| 8.2.3 Review product and service requirements and record results. |
| 8.2.4 Amend documents if product or service requirements change. |
| 8.3 Establish a process to design and develop products and services. |
| 8.3.1 Create an appropriate design and development process. |
| 8.3.2 Plan product and service design and development activities. |
| 8.3.3 Determine product and service design and development inputs. |
| 8.3.4 Specify how design and development process are controlled. |
| 8.3.5 Clarify how design and development outputs are produced. |
| 8.3.6 Review and control all design and development changes. |
| 8.4 Monitor and control external processes, products, and services. |

| ISO 9001: 2015 Outline |
| --- |
| 8.4.1 Confirm that products and services meet requirements. |
| 8.4.2 Establish controls for external products and services. |
| 8.4.3 Discuss your requirements with external providers. |
| 8.5 Manage and control production and service provision activities. |
| 8.5.1 Establish controls for production and service provision. |
| 8.5.2 Identify your outputs and control their unique identity. |
| 8.5.3 Protect property owned by customers and external providers. |
| 8.5.4 Preserve outputs during production and service provision. |
| 8.5.5 Clarify and comply with all post-delivery requirements. |
| 8.5.6 Control changes for production and service provision. |
| 8.6 Implement arrangements to control product and service release. |
| 8.7 Control nonconforming outputs and document actions taken. |
| 8.7.1 Control nonconforming outputs to prevent unintended use. |
| 8.7.2 Document nonconforming outputs and the actions taken. |
| **9. Evaluation** |
| 9.1 Monitor, measure, analyse, and evaluate QMS. |
| 9.1.1 Plan how to monitor, measure, analyse, and evaluate. |
| 9.1.2 Find out how well customer expectations are being met. |
| 9.1.3 Evaluate effectiveness, conformity, and satisfaction. |
| 9.2 Use internal audits to examine conformance and performance. |
| 9.2.1 Audit your quality management system at planned intervals. |
| 9.2.2 Develop an internal audit program for your organization. |
| 9.3 Carry out management reviews and document your results. |
| 9.3.1 Review suitability, adequacy, effectiveness, and direction. |
| 9.3.2 Plan and perform management reviews at planned intervals. |
| 9.3.3 Generate management review outputs and document results. |
| **10. Improvement** |
| 10.1 Determine improvement opportunities and make improvements. |
| 10.2 Control nonconformities and take appropriate corrective action. |
| 10.2.1 Correct nonconformities, causes, and consequences. |
| 10.2.2 Document nonconformities and the actions that are taken. |

| 10.3 Enhance the suitability, adequacy, and effectiveness of your QMS. |
|---|

Table 2.2 shows the composition and focus of the revised sections of the ISO 9001:2015 standard. de Vries and Haverkamp (2015) go on to describe the ISO 9001 system as a system of control that assures that an organisation's products and services meet the customer's requirements. Control is achieved through process management of policy implementation, written procedures, registrations, product requirements, corrective actions, preventative actions, audits, management reviews and gauging customer satisfaction. Employees are expected to function in accordance with the quality management system that would include a quality manual, written procedures and procedures. Managers would review employees and would also be reviewed by internal and external audits.

## 2.4 Empirical Review

The empirical literature review aimed to investigate the context of the ISO 9001 implementation, barriers and successes. From the literature review it is apparent that there is wide availability of research on ISO 9001. Table 2.3 shows a scan of the various themes of research that is being done on the standard, its implementation, benefits and links to quality and performance. The table below is indicative of the various ideas available in these resources and while not exhaustive, does indicate a lack of more contemporary research in the South African context and even more limited research is available for the engineering industry itself.

Table 2.3 Empirical review themes & sources

| ISO Themes present in Literature | Research Authors |
|---|---|
| 1. Benefits | Carmignani, 2008<br>Poksinska, Ekland & Dahlgaard, 2006<br>Rusjan, 2010 |
| 2. Effective Implementation | Psomas *et al.* 2010<br>Sampaio *et al.,* 2012<br>Levine and Toffel, 2010<br>Ingason, 2014 |
| 3. Implementation Barriers | Zeng and Tian, 2007<br>Vouzas, 2007<br>De Vries and Havercamp, 2015<br>Thilakarathne and Chithrangani, 2014 |
| 4. Production Efficiency | Tzelepis *et al.,*2006<br>Dick *et al.,*2008<br>Martinez-Costa *et al.,*2009 |

| ISO Themes present in Literature | Research Authors |
|---|---|
| 5. Success Factors | Ivanova *et al.,* 2016<br>Psomas, 2017<br>Babatunde, 2015 |
| 6. Production context - Process Management | Willar *et al.,*2016<br>Abusa and Gibson, 2013 |
| 7. Total Quality Management Implementation | Prajogo and Sohal, 2006<br>Babatunde, 2015<br>Ochieng, 2015 |
| 8. Perceptions of Stressors | Ebrahimi and Chong, 2014<br>Marde, 2015 |
| 9. Costs on Implementation in Construction Industry | Harrington and Voehl, 2012<br>Ambrose and Classen, 2004<br>Marta-Lima *et al.,* 2016 |
| 10. Economic Impact | Aba *et al.,* 2016<br>Sampaio *et al.,*2012<br>Sampaio *et al.,* 2009 |
| 11. Performance Measures and Quality | Psomas and Kafetzopaulos, 2014<br>Chiarini, 2015 |
| 12. Completive advantage and sustainability | Elshaer and Augustyn, 2016<br>Qi *et al.,* 2013 |
| 13. TQM Dimensions, Quality, Implementation advice for Small Business contexts | Burli *et al.,*2012<br>Aldowaisan and Yousesef, 2004<br>Berger, 2009 |
| 14. ISO repository and Guides | ISO, 2015 (online resources) |

### 2.4.1 Benefits of ISO 9001 Implementation

The ISO 9001 quality standard aims to increase a firm's performance by focusing on addressing seven quality management principles namely; Customer focus, Leadership, Engagement of people, Process approach, Improvement, Evidence-based decision making and Relationship management (iso.org, 2016b)). ISO(iso.org, 2015) goes on to state that the standard aims to help organisations, "be more efficient and improve customer satisfaction." This would imply that a variety of benefits could be realised in the areas denoted by the seven principles. Empirical evidence has shown that companies that were internally motivated to adopt the ISO 9001 standard, with management buy in, achieved better performance levels than companies that were externally motivated to obtain the certification for marketing reasons (Rusjan and Alic, 2010). Prajogo and Sohal (2011) cited in Valmohammadi and Kalantari (2015) state that internal motives are focused on building an effective, quality assurance program that includes procedure monitoring, documentation, reduction of errors, operational traceability, client engagement and after-sales service. The relationship between implementation of the standard and organisational performance is strengthened by internal motives (Valmohammadi and Kalantri 2015).

From a customer perspective Rusjan *et al.,* (2010) indicate that the basic benefits are improved supplier selection, improved service quality, fewer complaints due to less non-conformity and improved customer communication. These consequently resulted in improved customer satisfaction, improved company image, customer retention, increased new customers and thereby increased sale volumes (Rusjan *et al.,* 2010). Summers (2009) suggests that as an internationally recognised standard, ISO 9001 opens an organisation to worldwide markets and suppliers.

Within the company's structure, effective ISO 9001 implementation can result in reduced costs due to less rework and reduced scrap coupled with improved productivity (Summers 2009). Improved profitability because of reduced production costs was found to be an added benefit (Rusjan *et al.*, 2010).

Dick, Heras and Casadesús (2008) provide a casual model that relates the expected improvements from quality management certification leading to improved business performance, as shown in Figure 2.4.

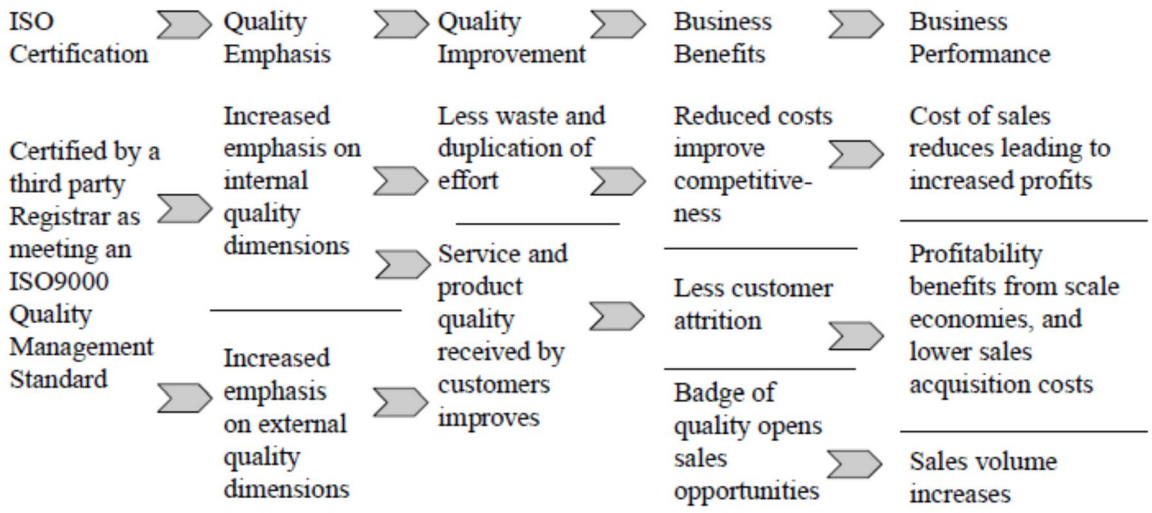


Figure 2.4: Linking ISO 9000 standards and business performance
Adapted from Dick, G.P.M., Heras, I. and Casadesús, M. (2008),"Shedding light on causation between ISO 9001 and improved business performance", *International Journal of Operations & Production Management*, Vol. 28, Iss 7 pp. 687 – 708.

According to Dick *et al.,* (2008), there are expected links between management system certification to ISO 9000 standards and business performance. This can be illustrated as a continuum involving an emphasis on quality leading to an improvement on quality that translates into benefits for the business.

Psomas and Pantouvakis (2015) described further that performance benefits could be described by the following dimensions:

- Service/product quality (e.g. specification conformance, reliability)
- operational performance (e.g. efficiency, productivity rate)
- market performance (e.g. market share)
- financial performance (e.g. profits)

Rusjan *et al.,* (2010) cite improved clarity of the processes to be performed and thereby a decrease in external auditing and customer control over the processes. Improved employee work morale along with improved knowledge dissemination among employees and a commitment to continuous improvement are also noted (Rusjan *et al.,* 2010). In a service industry setting the literature shows that product/service quality and operational performance are directly improved by increasing ISO 9001 effectiveness (Evangelos, Pantouvakis and Kafetzopoulos, 2013). Aba, Badar and Hayden (2016) show that ISO 9001 certification is

related statistically to operating performance where certified firms have better operating performance than similar non-certified firms. In addition, Evangelos *et al.,* (2010) state that improved operational performance indirectly improves financial performance. However, it has been argued by Sampaio, Saraiva and Monteiro (2012) that direct financial benefits were not easily identifiable by quality managers who had the perception that their firm's internal organization had improved. Also, that higher profitability rates amongst ISO 9001 certified firms may be related to profitable companies that have the propensity to become ISO 9001 certified and functioning of such firms in economic sectors that exhibit greater profitability levels (Sampaio, Saraiva and Rodrigues, 2009).

### 2.4.2 Barriers and Challenges of ISO 9001 Implementation

The significant barrier encountered with the implementation of the ISO standard included a lack of buy-in from the employees and buy-in from top management (Poksinska, Ekland & Dahlgaard, 2006). Lack of commitment by quality managers leads to a lack of importance placed on the quality management system tool by employees (Poksinska *et al.,* 2006). The literature has indicated that consistent top management involvement as well as direct employee participation is key to successful implementation (Sampaio *et al.* 2009; Ingason, H.T. 2015; Mata-Lima, Morgado, da Silva, Alcantara and Almeida, 2016 and Ivanova 2014 and also Gray and Sinha, 2014).

Poksinska *et al.,* (2006) also identified a negative emphasis on documentation and a misunderstanding of the role of documentation contributed to low levels of implementation. Other barrier identified were high implementation and maintenance costs, lack of industry specific knowledge by auditors, ethical issues ascribed to certification bodies and differing interpretation of standards among certification bodies Sampaio *et al.,*(2009). Added to this is the short-sighted goal of 'getting certified', acquiring the standard as a mandatory requirement for business tenders and over-expecting the standard to eradicate performance issues without continual improvement (Zeng, Tian and Tam, 2007).

A misunderstanding of standardisation of work processes was also observed which could lead to an interpretation of the QMS tool, to control employee's behaviour and possibly resulting in resistant demotivated employees who could adversely affect performance outputs (de Vries, 2015; Poksinska *et al.*, 2006).

Other identified challenges to implementation are the lack of resources and training (Ismyrlis, Moschidis and Tsiotras, 2015).

### 2.4.3 Diffusion of ISO 9001 & South African Context

The ISO 9001 is by far the most popular adopted standard in the world as shown from an excerpt by ISO surveying their certification adoption globally in Table 2.4 below.

Table 2.4 Number of global ISO certifications by December 2014
Aadapted ISO. (2015a). *The ISO Survey*. Available: https://www.iso.org/the-iso-survey.html. . (Accessed 20 July 2017).

| Standard | Number of certificates in 2015 | Number of certificates in 2014 | Change | Change in % |
|---|---|---|---|---|
| ISO 9001** | 1033936 | 1036321 | -2385 | -0.2% |
| ISO 14001*** | 319324 | 296736 | 22 588 | 8% |
| ISO 50001 | 11985 | 6765 | 5 220 | 77% |
| ISO 27001 | 27536 | 23005 | 4 531 | 20% |
| ISO 22000 | 32061 | 27690 | 4 371 | 16% |
| ISO/TS 16949 | 62944 | 57950 | 4 994 | 9% |
| ISO 13485 | 26255 | 26280 | -25 | -0.1% |
| ISO 22301 | 3133 | 1757 | 1 376 | 78% |
| ISO 20000-1 | 2778 | | 2 778 | |
| **TOTAL** | **1519952** | **1476504** | **43 448** | **3%** |

According to ISO Survey (2015), there has been a slight decline from 2014 to 2015 in the number of ISO 9001 certificates adopted worldwide but, the standard is still the most adopted standard globally.

The diffusion of ISO 9001 is very extensive across the world. This is depicted in the map below in Figure 2.5 showing the distribution of the ISO 9001: 2008 across the globe (Green Power Labs, 2015). South Africa has fewer than ten thousand companies certified. However, South Africa remains one of the highest certification levels across Africa. It is also apparent from the distribution of the certification across the globe and in South Africa, that the transition to the 2015 version by 2018 is imperative in order to maintain a certification status.

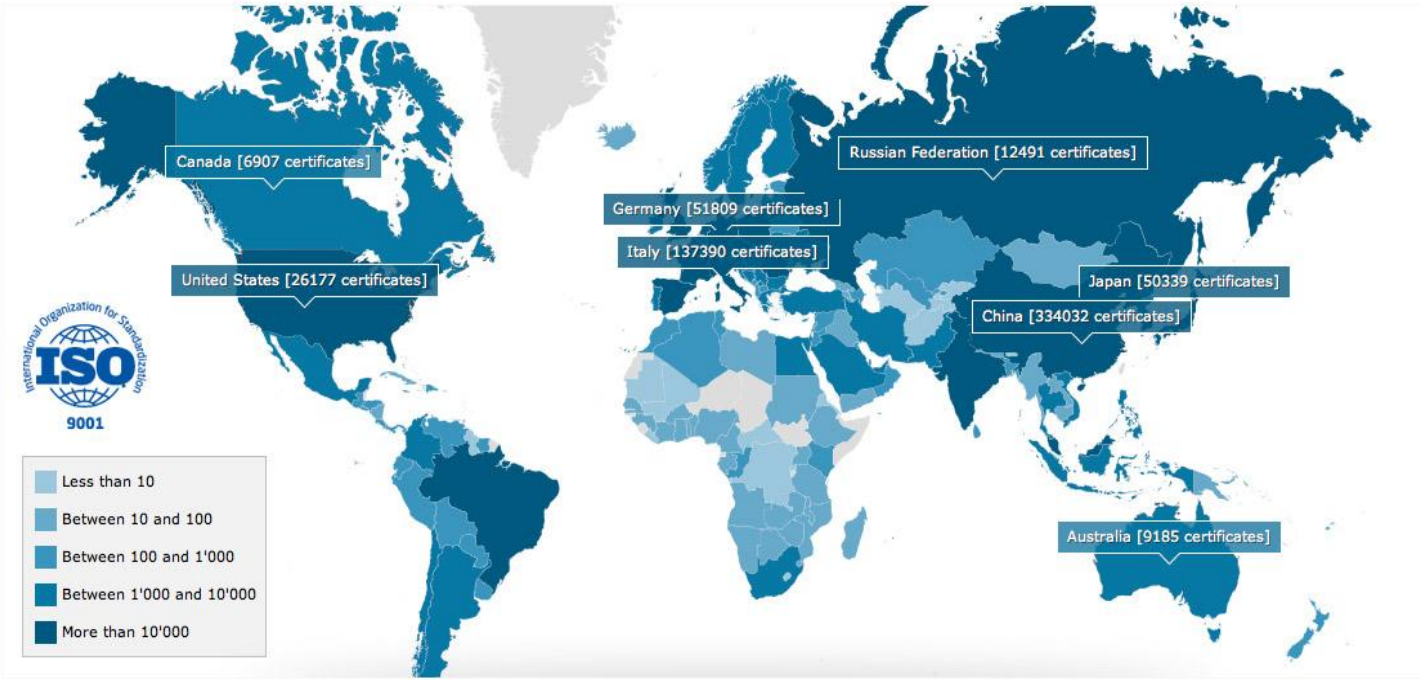


Figure 2.5 Global Diffusion of ISO 9001
Adapted from Green Power Labs. (2015). Available: https://greenpowerlabs.com/news/iso-9001-2008-certification/ (Accessed 20 July 2017).

The spread of ISO 9001 standard is a widespread global phenomenon with varying concentrations of its adoption in various places.

In the South African consulting engineering context the adoption of ISO 9000 standards and ISO 9001 in particular, is being promoted by voluntary professional engineering associations such as Consulting Engineers of South Africa (CESA formerly known as SAACE South African Association of Consulting Engineers) by encouraging the implementation and maintenance of a system of quality management in engineering firms by advocating the use of ISO 9001 amongst member firms (Ambrose and Claasen, (2004), IMESA News (2004), IMESA News (2008). Part of the Consulting Engineers of South Africa advisory note of 2003, where a change in its constitution requiring the use of a QMS, states that,

> "*A Quality Management System (QMS) is no more than a common-sense documentation of the controls that you implement at the various stages of your product/service delivery process. For this reason, a QMS is as applicable if you have a staff of 1 or a staff of 500.*
> *CESA requires that your firm must, irrespective of its size, have a QMS in*

*place. This is not an onerous undertaking. In fact, it is nothing more than good business common sense. Your quality management system should be the basis for the way you deliver your product and service. "The way things are done" in your organization.*

*ISO 9001:2000 is a comprehensive, internationally recognized common sense approach for managing and controlling a consulting company in order to ensure customer satisfaction and the delivery of a quality product and service. The issues that ISO 9001:2000 focuses on are the issues that your firm should also be focusing on in order to achieve Quality. For this reason, CESA recommends using the ISO 9001:2000 frame work."*

(CESA Advisory Note, 2003)

In implementing the ISO 9001 standard consulting engineering firms will have to adapt it to suit their business operations. Consulting engineers typically run projects as part of their day to day operations. Projects tend to have the following five phases:

- Project Initiation
- Project Feasibility
- Design
- Implementation
- Project Closure and Support

Ambrose & Claasen (2004) suggest the application of quality management in the five phases of a project in the following way:

- ***"Initiation***

  *TQM begins with marketing, and a good marketing plan will incorporate ascertaining the real needs of the client….*

- ***Feasibility***

  *Preliminary investigations and the preliminary design report assess the feasibility of the client's need being met. The question of funding is addressed...*

- ***Design***

  *The detailed design is completed and converted to working drawings and documentation. This incorporates optimizing the design to maximize the value to the client at the least cost. The project specification should contain any variations and additions to the standard specifications applicable to the particular project, in order to facilitate TQM application during construction.*

  *The tender process is then pursued to find the right contractor to add to the project team. The tenders are assessed to determine whether the contractors have the necessary skills to execute the work. The client makes the final choice of contractor that is appointed.*

- ***Implementation***

  *The project team makeup is thus completed, and the project staff must be made aware of the importance of applying the TQM principles. A comprehensive quality control system, focusing on the prevention rather than the detection of quality problems, should be implemented. Project performance must be monitored on a regular basis using the self-assessment instruments described above as basis. Proper records of such self-assessments will provide future performance benchmarks.*

  *The workforce engaged must be properly skilled to enable quality work to be produced; which ultimately will lead to less conflict. The culture of individual responsibility will enable the move from an external to internal focus of control. The customer-supplier interfaces are the core of TQM, and their proper function must be facilitated at each level to ensure smooth application of the TQM system.*

- ***Closure and Support***

  *On project closure, the asset is handed over to the client. It must be determined whether the client has the capacity to maintain the asset, and where applicable, the training of client staff "*

It is intuitive that in the consulting engineering context that the requirement for quality is a relevant and necessary concept for the success of project completion and thereby business success and continuity.

The literature review shows a lack of information on ISO 9001 standard implementation in South Africa. It is not clear whether this is because of a reluctance of firms in sharing information on their quality management systems or simply it's just an area of research that has received little exposure. A research gap exists in determining whether use of the ISO 9001 standard in the local Durban area context accrues the benefits that the literature suggests. This also requires an evaluation of the challenges that are experienced in consulting engineering firms in Durban. A simple conceptual framework of the study is shown below:

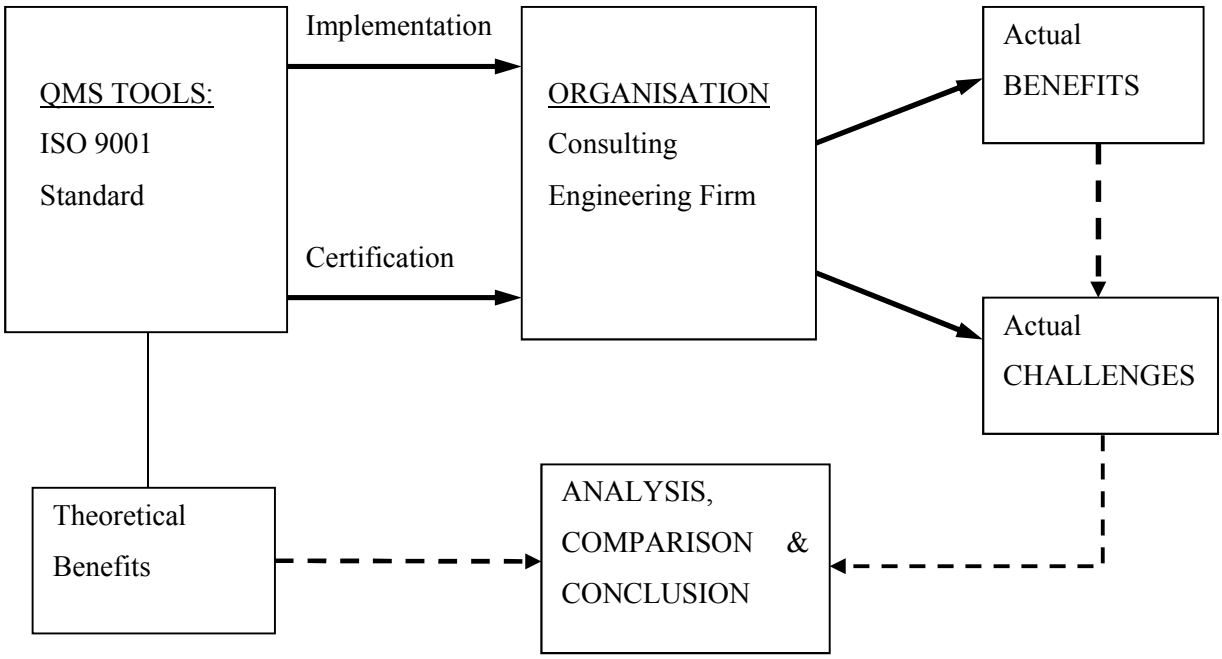


Figure 2.6: Conceptual Framework of this Research.
Researcher's own work

In the implementation and certification of QMS tools adopted by an organisation, the study framework essentially looked at the analysis and comparison of theoretical benefits obtained from the literature review (both theoretical and empirical) against actual benefits and challenges obtained from empirical review from the research conducted.

## 2.5 Summary

The literature review shows the various dimensions associated with implementation of ISO 9001 in organisations. These dimensions show benefits and challenges that have been experienced thus far in implementing the ISO 9001 standard. The lack of information for South African consulting engineering firms creates a knowledge gap that the research in the following chapters aims to contribute to. The following chapter looks at the research methodology employed in answering the research objectives.

# CHAPTER THREE: RESEARCH METHODOLOGY

## 3.1 Introduction

This chapter presents the research methodology used in the research study. The choice of research, the study setting, sampling, data collection as well as ethical considerations are also discussed.

## 3.2 Aim of the study

The aim of the study was to determine the perceptions of Durban based consulting engineering firms in terms of the benefits and challenges of using the ISO 9001 standard. These perceptions should be unique to each firm's experience but may have common or similar underlying themes that these perceptions stem from. It is therefore critical that the appropriate method was adopted to investigate these perceptions so that the research could achieve its objectives and thereby contribute meaningfully to the research stakeholders.

## 3.3 Research Methodologies

According to Fox & Bayat (2007), the various types of research can be divided into two broader categories of research, namely quantitative and qualitative research. Creswell (2014) goes on to add that there is a third category of research, namely mixed methodology research that can be utilised.

### 3.3.1 Quantitative Research

Quantitative research can be described simply as research that concerns things that can be counted (Fox & Bayat, 2007). It generally uses statistics to process, explain and summarise data into findings. According to Leedy & Ormrod (2005) it is used to explain relationships between measured variables and tries to explain, predict and control phenomena. Leedy & Ormrod (2005) refers to this type of research as having a traditional or experimental approach. Findings are communicated via numbers, statistics, aggregated data and presented in a formal, scientific style (Leedy & Ormrod, 2005:96).

### 3.3.2 Qualitative Research

Qualitative research attempts to explain scientifically events, people and issues linked with them and does not depend on numerical data (Fox & Bayat, 2007). It can make use of

quantitative methods but typically used to describe and understand phenomena from a participant's point of view (Leedy & Ormrod, 2005). According to Leedy & Ormrod (2005) one can also refer to this approach as being an interpretive or constructivist approach. Findings are communicated via words, narratives, individual quotes and presented in a personal literary style (Leedy & Ormrod, 2005:96).

### 3.3.3 Mixed Methodology Research

Mixed methodology refers to research that combines elements of quantitative and qualitative research together to broaden the understanding of issue being researched (Creswell, 2009). Creswell (2009) describes mixed methodology as using one method to better understand or add on to the results of the other methodology. This methodology was selected for this research as one can obtain more width and depth from the respondents about the issue concerned. Within the various mixed methodology research strategies, one can use a concurrent embedded strategy which is a strategy that has one data collection phase that collects both quantitative and qualitative data simultaneously (Creswell, 2009:214). In this strategy, a secondary method (quantitative or qualitative) is embedded within a predominant method (qualitative or quantitative). This concurrent embedded method can be used where a primarily qualitative design can embed some quantitative data to enrich the description of the participants. A research instrument was developed along this basis.

## 3.4 Study Setting

Durban has a large business sector comprising an estimated 2796 member businesses registered on the Durban Chamber of Commerce and Industry (DCCI, 2015). In terms of the Consulting Engineers of South Africa (CESA) there is a membership of approximately 540 consulting engineers nationally. The representation of consulting engineers in Durban was not available making determining the population size difficult. An initial inquiry on CESA's website for firms located in Durban and who have a quality management system in place revealed 63 firms. These 63 firms are referred to as the population size from which a sample was drawn.

## 3.5 Population, Sample and Sampling

A mixed methodology study was chosen which followed a concurrent embedded strategy that has one data collection phase that collects both quantitative and qualitative data simultaneously (Creswell, 2009:214). This concurrent embedded method was used so that the

primarily qualitative research design could embed some secondary quantitative data to enrich the description of the participants.

As described in section 3.3 the population size was 63 firms. According to The Research Advisors (2006) sample size selection table, the appropriate sample size for quantitative study, by linear extrapolation, should be 53 firms. This is based on a confidence level of 95% with a margin of error of 5% (The Research Advisors, 2006). For the qualitative aspect of the study, due to the limited timeframe of the research and the possibility of a low return rate for the questionnaires, a target of 15-20 respondents was selected. This was approved by the university research ethics committee. A qualitative approach requires fewer participants as it is focused on depth of information researched and not just extent.

Purposive sampling enables the researcher to engage in a purposeful selection of research participants that have specific knowledge and experiences in the research question (Creswell, 2003) and this was achieved by choosing engineering firms with ISO 9001 certification status. These firms had a vested interest in this specialised topic.

For the target population, one person from each of the selected firms was approached to assist with the data collection. This person was either an owner of the business, a director or senior manager in charge of implementing the ISO 9001 standard at the firm.

The response rate of the selected firms was low with only 14 valid responses. This low response means that the findings cannot be generalised with any degree of confidence.

### 3.6 The Adopted Methodology (Research paradigm)

During the early process of disseminating the research instruments it was discovered that prospective participants could not assist with the research, despite having intimated that they would do so. This resulted in a shrinking population to draw the sample size from, which affected the research in that the statistical requirements for a sample could not be met. As a mixed methodology study had been prepared and approved by the university ethics committee and given that the dissertation submission date was looming, there was no alternative but to proceed with the study even though it would have reduced significance and the findings would thus not be generalisable; due to the sample size not being statistically sound.

In view of the above, this research falls within the ambit of a qualitative approach supported by some descriptive quantitative statistics because it is an exploratory and explanatory research into the perceptions of the ISO 9001 standard implementation in selected consulting engineering businesses in Durban.

### 3.7 Research Instrument

In qualitative focused research, the data collection method used tends to be an interview that can be structured along a standard set of open ended questions. They can also be a semi-structured interview where probing questions based on a standard set of questions are used to get clarity on the interviewees reasoning (Leedy & Ormrod 2005:184). However, due to logistical challenges in terms of travel and time constraints, it was opted to use self-administered written questionnaires. The advantage of questionnaires is that they can be sent to many people who may live many kilometres away thereby saving the researcher travel expenses (Leedy & Ormrod 2005). The questionnaires also create a greater sense of anonymity that may encourage more truthful responses. However, questionnaires have their disadvantages in that they may have a low return rate because people do not return them (Leedy & Ormrod 2005).

The research instrument used was concise questionnaire comprising of open and closed-ended questions. Principles of good questionnaire design were consulted as detailed in Figure 3.1 (Sekaran, 2003: 238) below.

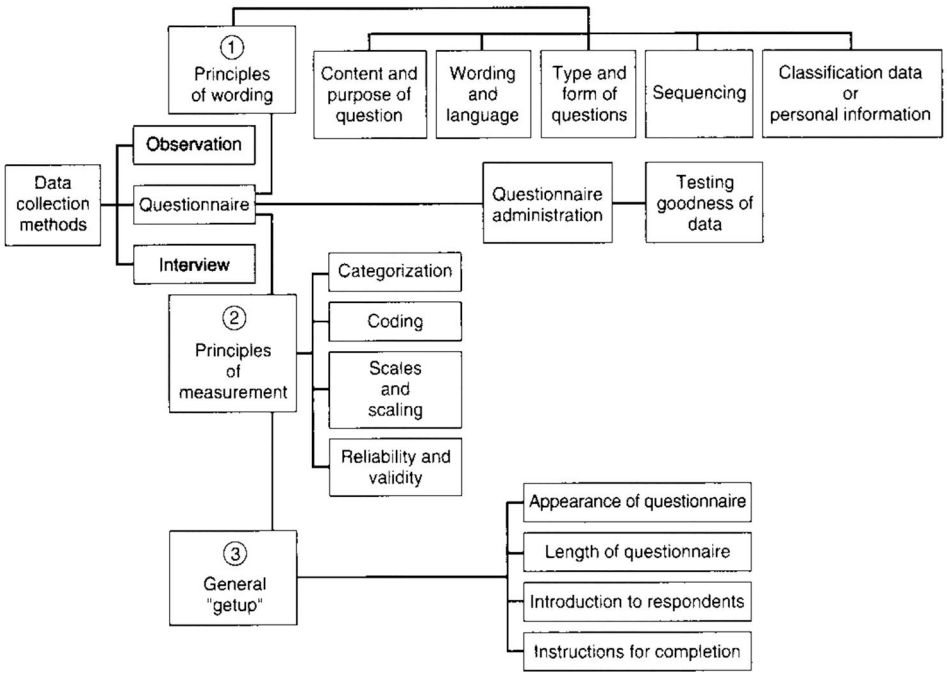


Figure 3.1: Principles of Questionnaire formulation.

Adapted from Sekaran, U. (2003). *Research Methods for Business: A Skill Building Approach,* Hoboken: John Wiley & Son. pp 238

According to Sekaran (2003:238) principles of good questionnaire design include an emphasis on wording, measurement and the general makeup of the questionnaire. Some measure of quantitative assessment was used in the questionnaire to establish background information and characteristics of the respondents.

The questionnaire was distributed to the identified primary data sources via email. Questionnaires by electronic mail are a recognised technique of qualitative enquiry and specific guidelines are presented to achieve maximum return rates via the following (Leedy and Ormrod, 2005: 195):

- Consider appropriate timing in sending the questionnaire
- Make a good first impression: Professional and well-prepared document with an appealing design.
- Motivate responders with a cover letter and making the aim and significance of the study compelling and interesting.
- Offer the finalised thesis for perusal to the interviewee.
- Be gentle and persistent in following up telephonically or by email.

### 3.8 Pilot Study

The purpose of pre-testing or piloting the questionnaire has ensured that the questions fully understood by the participants and there were no problems with the wording or understanding.

Pilot studies remain an important component of research conducted through the use of questionnaires. While a pilot study does not guarantee success in the use of the research instrument, it does increase the likelihood of coherency of the findings. The pre-test phase allowed for the evaluation of the research methods of the study to be considered. Feedback from the pilot test was incorporated into the finalisation of the interview questions for both open and closed-ended questions (Saunders, Lewis & Thornhill, 2012).

A pilot study was done using 3 suitably qualified people to assess the research instrument. The respondents were satisfied with the content thus confirming face validity of the instrument. The only changes suggested were to modify the layout of the instrument.

### 3.9 Data Collection

Both primary and secondary data sources are exploited in this study. Primary data sources are represented by data that is closest to revealing the true aspects of a phenomenon (Leedy and Ormrod, 2005) The primary data sources for this research were respondents from member firms selected from the following organisations :

- Consulting Engineers of South Africa (CESA)
- Engineering Council of South Africa (ECSA)
- South African Institute of Civil Engineers (SAICE)
- South African Bureau of Standards
- Consulting Engineering Firms

The firms were vetted for having the ISO 9001 certification and not just any quality management system. This was achieved via direct telephone calls and emails to confirm the firms ISO 9001 certification status. Most of the firms were members of CESA which implored its members to have ISO 9001 certification in place.

The secondary data sources included:

- Books, periodicals, popular articles and newspaper articles.
- Stats SA – census and industry data

### 3.10 Data Analysis

Data analysis "is the process of bringing order, structure and interpretation to the mass of collected data", (Marshall & Rossman, 1999; 150). The data was analysed for emerging patterns and themes that relate to the initial research objectives. The qualitative analysis framework identified patterns of responses in keeping with the following steps as recommended by Leedy & Ormrod (2005: 141):

- Identify common statements that relate to the topic
- Group responses into meaningful units
- Seek divergent perspectives
- Construct a composite view or explanation revealed through the data analysis (interpretation).

Leedy & Ormrod (2005:96) also recommend the following framework for the quantitative analysis:

- Statistical analysis
- Stress on objectivity
- Deductive reasoning

The results were tabulated and collated and were represented graphically where appropriate.

### 3.11 Limitations of the Study

The study recognizes that the subjective data obtained was limited to the perceptions of one director/owner or senior manager of each firm. The information supplied by the manager could not be verified and it is assumed that the respondents provided honest feedback.

The protracted delay in securing an Ethical Clearance adversely impacted on the study. The Notification of Ethical Clearance took approximately 6 weeks from application to notification leaving the rest of the research i.e. contacting potential participants, data collection and dissertation production, to be conducted in the short project time that remained.

The data collection process was a limitation to the width of the data available as the research sample size returned from the target population was statistically small for the quantitative aspect of the research. The quantitative findings of the research cannot be generalised as they are not statistically sound.

The scope of respondents could have been increased to include employees of the firms thereby resulting in a possible collection of sufficient statistical data for the quantitative element of the research. However, the short time frame for the study could not allow for this larger data collection process.

### 3.12 Ethical Considerations

The respondents were informed of the nature of the research and were given the right to withdraw from the research at any time without consequence to them. To this ends a consent form was signed by the participant acknowledging that they were not coerced into filling out the questionnaire and that they were willingly volunteering information to the study. The participants were informed that the information shared was done anonymously.

### 3.13 Difficulties Encountered in the Research

The preferred methodology for the research was a mixed methods methodology that informed the research instrument. Communication with prospective respondents yielded low participation levels due to some firms not having the time to assist with the research. Some larger firms also had the ISO 9001 certification certified at their main branch located outside of Durban which disqualified them from taking part in the study. Others indicated that they had a different quality management system in place other than ISO 9001. During this period, the research instrument was issued with both qualitative and quantitative elements to it, and unfortunately only 32 firms out of a potential 63 firms indicated that there was a possibility of them assisting in the research. However, the final number of respondents with completed questionnaires was 14 which according to The Research Advisors (2006) would have been statistically low if a purely quantitative study been conducted.

### 3.14 Summary

This chapter defined the aims, conceptual research framework, methods and selected method used for the research methodology. Reasons for the selected sample population were presented and the instrument to be used for data collection from the sample was also discussed. A discussion on data analysis and the issues surrounding ethical considerations and the difficulties encountered in the research was also presented.

In the next chapter, the results of the data that was collected via the research instrument were analysed and were presented. The data was presented in tables, graphs and word clouds.

# CHAPTER FOUR: PRESENTATION OF RESULTS

## 4.1 Introduction

This chapter presents the research findings obtained from the various research participants during the data gathering period of the research. The findings were obtained from self-administered surveys that were sent to the identified participants by email. From the available relevant database of 63 firms, with a quality management system in place, a total of 32 firms indicated they could assist with the research. A total of 32 questionnaires were sent out for comment. A total of 15 responses were received back, with 1 response being invalid due to the firm not having the ISO standard in place, resulting in a total of 14 valid responses being received back. This represents a response rate of 43.75%. However, this was a mixed methodology study where too few respondents participated and as such the statistical and quantitative findings cannot be generalised to similar situations with any degree of confidence.

The survey research tool was divided into 3 sections as follows (a copy of the research tool can be found in Appendix 3): Section A: Respondent's background information, Section B: Firm's ISO 9001 certification background and Section C: Perceptions of ISO 9001 implementation. Section A and Section B were combined to provide a profile of the respondents. Section C had a series of questions that related to the research objectives.

The chapter presents the profile of the respondents, their perception of ISO 9001 implementation, the challenges experienced in adopting the ISO 9001 certification and the effectiveness of the ISO 9001 implementation. The chapter also presents the respondents suggestions for improving implementation of the ISO 9001 standard.

## 4.2 Profile of Respondents

### 4.2.1 Background Information

From section A of the research tool, the profile of the respondents reflected the following results in terms of their positions in the firm, age and the range of number of staff employed by the firm. The results showed that one half of the respondents were senior managers at their firms and the other half were owners, partners or directors of the firms they represented. The quantitative results are illustrated in Figures 4.1 & 4.2 below:

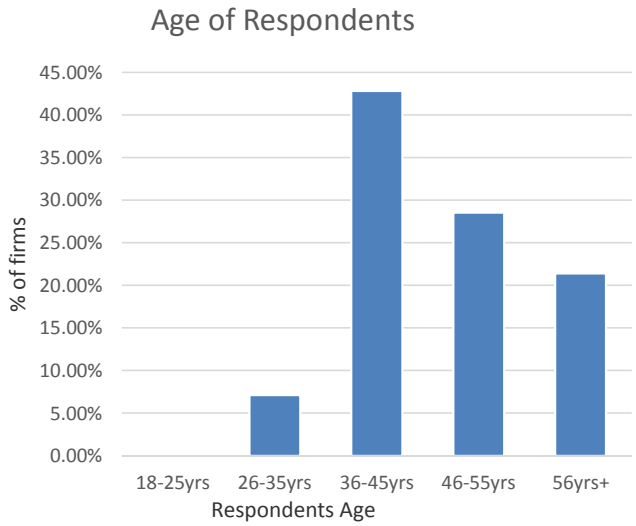


Figure 4.1: Age distribution of total number of respondents

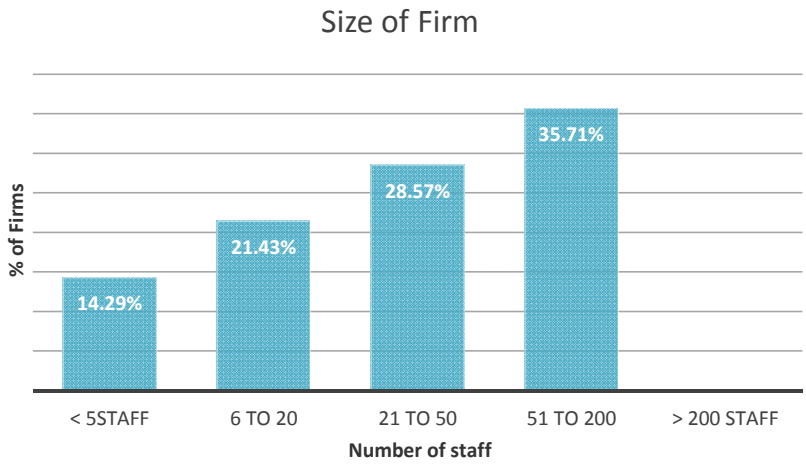


Figure 4.2: Size of respondents' firms in terms of staff employed

### 4.2.2 Firm's ISO 9001 certification background

In section B of the research tool, the firms' ISO 9001 certification background reflected the following quantitative results in terms of the percentage of firms and length of time of ISO 9001 implementation within their organisation (Figure 4.4).

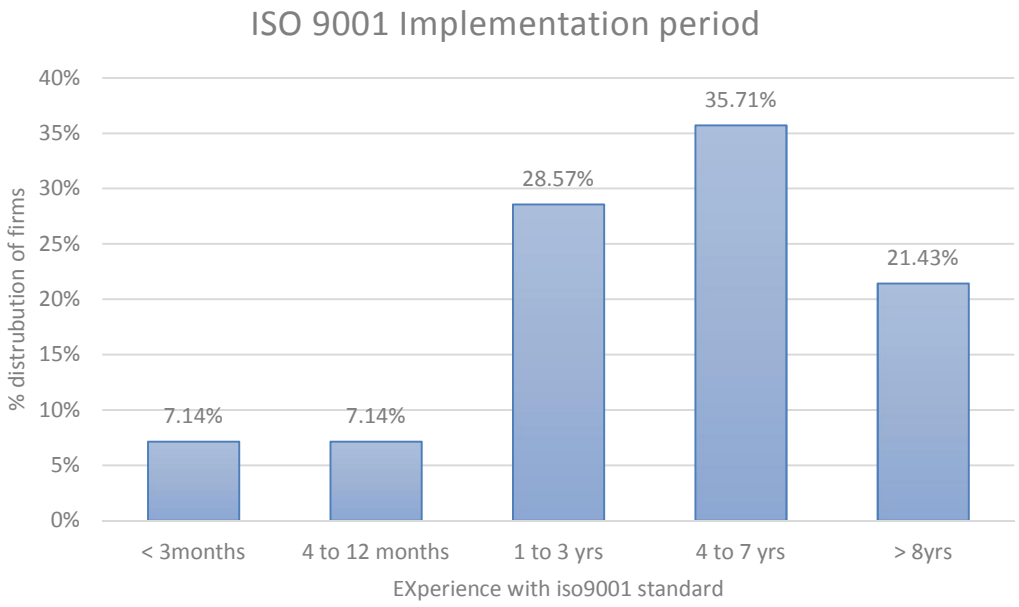


Figure 4.3: Percentage Distribution of n=14 firms and time spent using ISO 9001 standard

## 4.3 Perception of ISO 9001 Implementation

Section C of the research tool had a series of questions that related to the research objectives as shown in Table 4.1

Table 4.1:Link of objectives to research tool and location of relevant section in study

| Objective | Research Tool (Section C) – Question synopsis | Section |
|---|---|---|
| 1 | Question 1 - Factors of implementing ISO 9001 (*choose from a list*).<br>Question 1.1 - Factors in implementing ISO 9001.<br>Question 1.2 - Enhancement of industry practices (*Likert scale*).<br>Question 1.3 - Enhancement of competitive advantage (*Likert)* | 4.3 |
| 2 | Question 2- Challenges in obtaining ISO 9001 certification.<br>Question 3- Challenges in implementing ISO 9001.<br>Question 4- Challenges in sustaining ISO 9001. | 4.4 |
| 3 | Question 5- Is ISO 9001 being used effectively? (*Likert scale*)<br>Question 5.1 – Give reasons for answer in question 5. | 4.5 |
| 4 | Question 6- Improvement of implementation of ISO 9001. | 4.6 |

In section C of the research tool, the respondents were required to give their opinion on the following:

- The positive or negative factors that they experienced in implementing the ISO9001 standard certification by choosing from a list of possible options. They were also required to mention any additional positive or negative factors they had experienced in implementing the ISO 9001 standard. The results are shown in Figure 4.5 & Figure 4.6.
- On a 5-point Likert scale (from Strongly Agree to Strongly Disagree) indicate their opinion of whether the ISO 9001 standard enhanced industry best practices. This result is shown in Figure 4.7.
- On a 5-point Likert scale (from Strongly Agree to Strongly Disagree) indicate their opinion of whether the ISO 9001 standard enhanced competitive advantage. This result is shown in Figure 4.8.

> ***Note****: As a result of numerous respondents declining to participate in the research after having originally agreeing to participate, the target sample was drastically reduced to 14 respondents. This is explained earlier in section 4.1 of this chapter. Likert scale questions typically require larger quantitative data sets for the data analysis to be statistically reliable. To amend the study, one would have to reapply for ethical clearance which typically takes the university research office 4 weeks to respond. Had there been time to re-apply to the university research office to undertake a qualitative study, the Likert scale questions would have been deleted and the open ended qualitative questions would have been used. With two weeks to the dissertation submission date a revised ethical clearance would never have been considered in time. As such the research was conducted and the limitation of the weak (that is, not statistically sound) statistical quantitative aspect is thus recorded. Therefore, no generalisation is possible from the data gathered by the Likert scale questions.*

The results of this section are shown below:

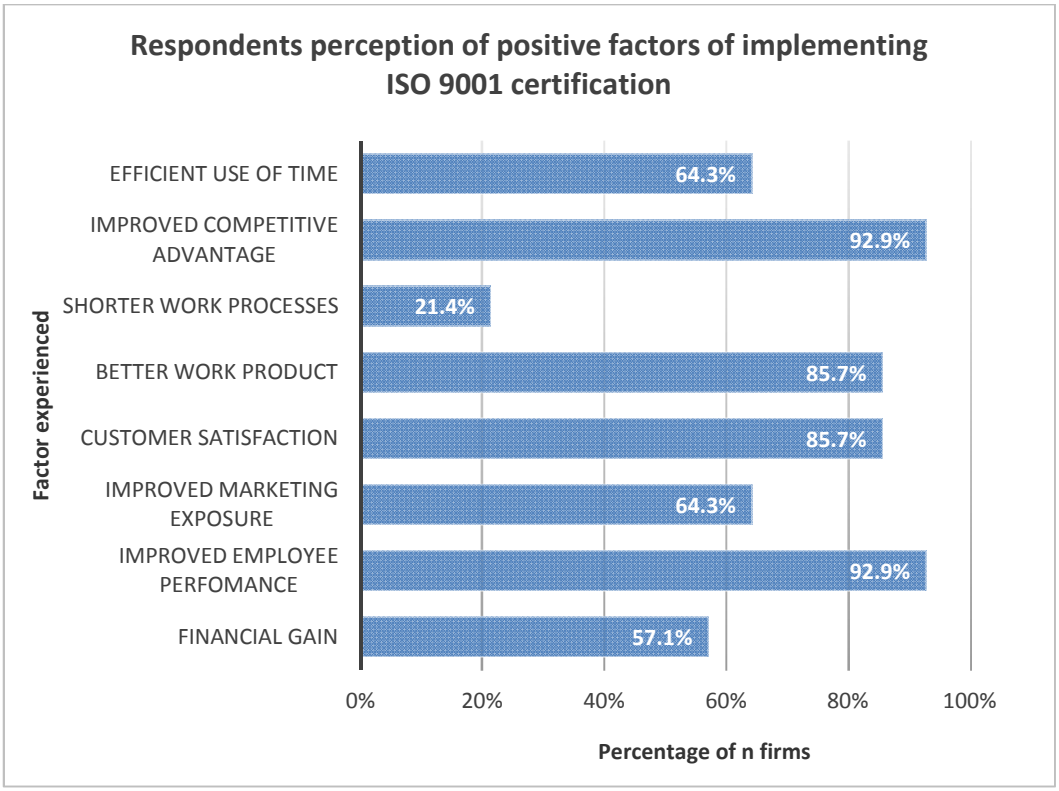


Figure 4.4: Respondents perception of positive factors of implementing ISO 9001 certification

The respondents noted that the significant positive factors of implementing ISO 9001 certification included improved competitive advantage, improved employee performance, better work product and customer satisfaction.

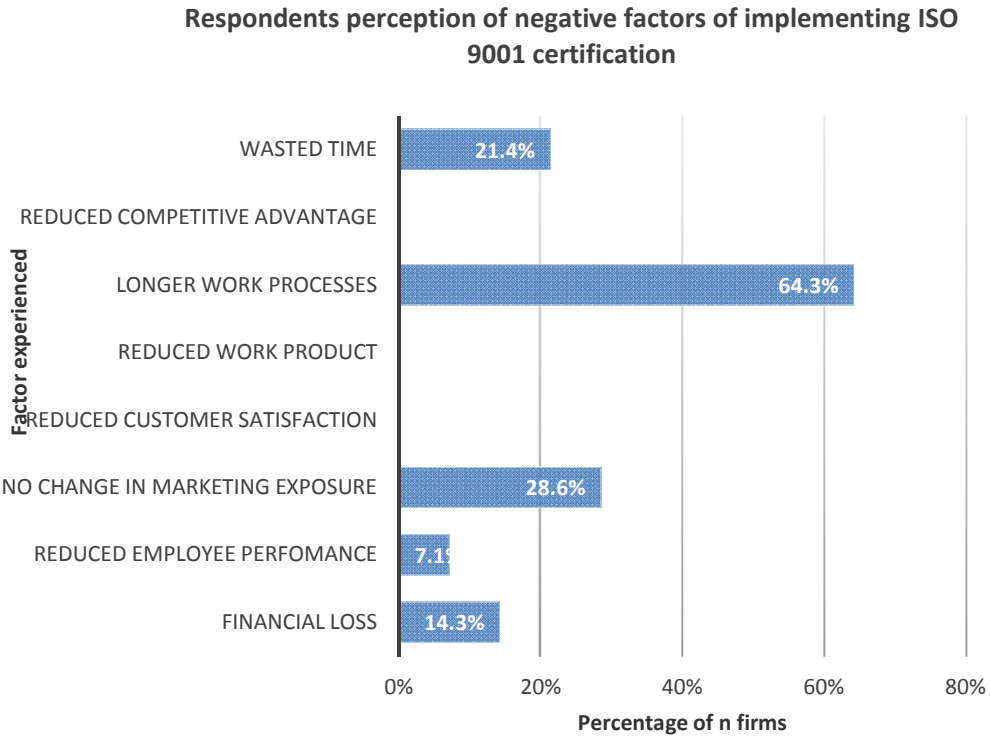


Figure 4.5: Respondents perception of negative factors of implementing ISO 9001 certification

The respondents noted that the significant negative factor of implementing ISO 9001 certification was that longer work processes were experienced.

Qualitative factors that were noted by the respondents are listed as follows in Table 4.2 below

Table 4.2 Positive and Negative Factors Experienced (Excerpts of Respondent Comments)

| Other Positive Factors Experienced | Other Negative Factors Experienced |
|---|---|
| "Overall quality control and checking systems have improved resulting in 100% reduction in design"<br><br>"Keeping records in an organised structure. Finding old relevant records/evidence on client enquiries"<br><br>"All documents are standard and all forms have reference numbers…"<br><br>"…standardized and therefore yields more consistent and more reliable results. The organization is therefore run based on processes rather than personalities. Where there are systems and processes, decision making is more likely to happen much faster and is likely to be the correct decision"<br><br>"Assisted with time sheets, invoicing and the auditing process."<br><br>"… It helps the management focus on Efficiency and overall improvement of the Organisation."<br><br>"Improves the company profile …Shows that we have a quality system in place"<br><br>"…Our Clients do feel more confident in us having controls in place." | "....in our opinion, the paperwork that needs to be completed and the audits that need to be done are excessive and time consuming…. it is time consuming and onerous on a small firm like ours"<br><br>"excessive documentation…" |

The results regarding the whether the ISO 9001 standard enhanced industry best practices and competitive advantage are shown in Figures 4.7 & 4.8 below:

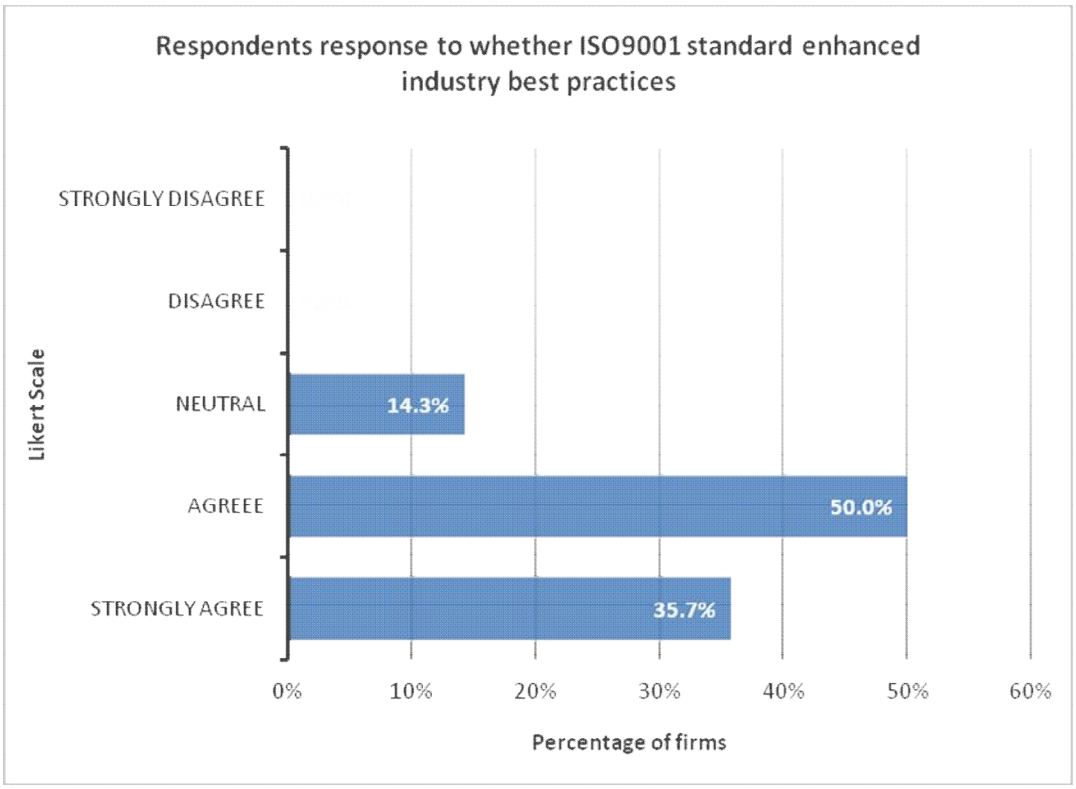


Figure 4.6: Likert scale grading of ISO 9001 enhancement of industry best practices

The respondents indicated that most of them agreed that the ISO 9001 standard enhanced industry best practices.

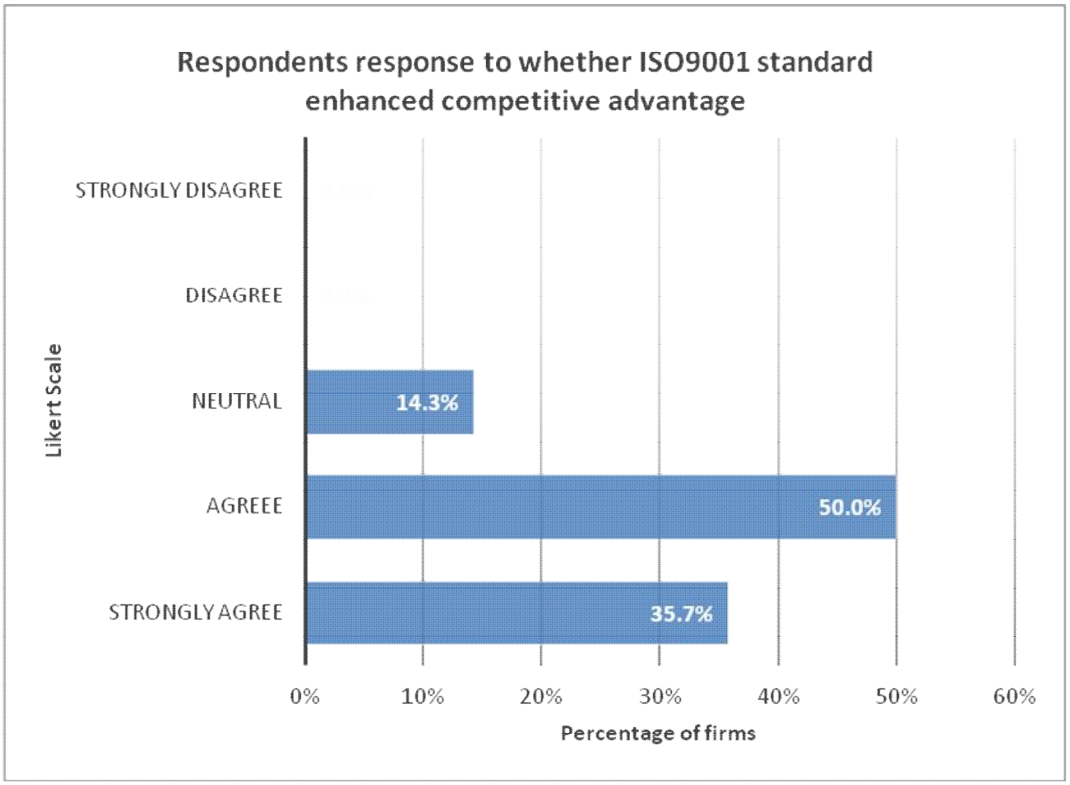


Figure 4.7: Likert scale grading of ISO 9001 enhancement of competitive advantage

The respondents indicated that most of them agreed that the ISO 9001 standard enhanced competitive advantage.

## 4.4 Challenges experienced in obtaining, implementing and sustaining ISO 9001 certification

The respondent's comments on the various challenges experienced by the respondents in obtaining, implementing and sustaining the ISO 9001 certification were captured, analyzed and summarized into broader themes. The frequency of these themes was also noted in each question. The comments are shown in Tables 4.3, 4.5 & 4.7. A corresponding summary of the themes found in the comments and their frequency are presented in Tables 4.4, 4.6 & 4.8. In addition, a word cloud software produced frequency of words present in the comments as shown in Figures 4.8, 4.9, and 4.10.

Table 4.3 Challenges experienced in obtaining the ISO 9001 certification amongst firms (comments)

- Mind-set changes especially in senior staff
- Management buy-in and management responsibility
- none
- Finding the time to complete all the pre-requisite audits to submit for formal accreditation. Getting all staff educated on the framework
- the cost of implementing the system is quite high, and as such it is more often than not viewed as a "wasteful endeavour"
- none
- As the organisation grows, the mind-set of people needs to change. However, this is addressed via aggressive training and workshops in ISO 9001
- The challenge with obtaining the certification lies with trying to convince the staff that the system can work for them instead of them working for the system. Change management becomes vital at this stage. The advantage at ……. is that the Directors and senior managers are also involved and some are process owners.
- No challenges for our business.
- constant scrutiny by auditors. Staff training is imperative to ensure a successful ISO9001 system. This becomes a costly exercise.
- none
- The compilation of the required documentation needed for the ISO 9001 certification was a challenge.
- Availability of required resources.
- Initially, get all to "buy in" to process. Formalising the existing systems/procedures. Preparing all documentation - very laborious
- It took a lot of time from the directors and in the end, we employed a person to drive the process as time was too costly

Figure 4.8 Word cloud summary of themes from Table 4.3

Challenges experienced in obtaining the ISO 9001 certification by the respondents indicated that the significant themes were time & monetary cost, management & staff buy-in and having a mind-set change in these firms.

Table 4.4 Challenges experienced in implementing the ISO 9001 certification amongst firms (comments)

- Sometimes deadlines take over and one does not follow the rules in terms of quality checks which then ends up a non-conformance
- Management responsibility and the logistics related to the system for the employees
- none
- n/a
- Getting employees to follow set procedures, having worked on no particular formalised system for the greater part of their careers, was a challenge. Employees view the systems as "additional work" as they have to track all the processes done to achieve a desired outcome.
- Time consuming, the availability of personnel
- none
- One of the challenges is that the older members of staff who have been doing things the-old-fashioned way do not readily embrace the standard. The other huge challenge is the reluctance of the staff to buy into the system- they see it as additional burden to their work.
- Staff adhering to ISO guidelines. You have to constantly check up on them.
- regular drivers required to ensure implementation
- staff buy in and owning the processes as suggested by the system. constant training as the business grows and take in new employees. Things can get out of hand
- 1. It involves a lot of paper works and filing of documents, which sometimes seems repetitive to most employees and consumes a lot of time.
  2. Lack of Top Management Support and understanding of ISO requirements.
  3. Inadequate Training and resistance of employees towards change.
- Getting all staff to adopt the formalised procedures. Some staff did not readily accept changes. Some staff became obstructionists.
- Buy in of all employees is an ongoing problem and need to be monitored and refreshed on a constant basis – it is also a constant training process that will be required


Figure 4.9 Word cloud summary of themes from Table 4.4

Challenges experienced in implementing the ISO 9001 certification by the respondents indicated that the significant themes were management & staff buy-in and having a mind-set change in these firms.

Table 4.5 Challenges experienced in sustaining the ISO 9001 certification amongst firms (comments)

- Keeping adequate records
- -there is a perception that ISO 9001 is an administrative tool/system which it is not
- none
- As the firm changes staff due to resignations, restructuring or other, new staff must be trained on the system and time and money are lost to training
- You need a dedicated person to sustain the ISO system. Most companies cannot afford it. Get feedback from customers takes long to return our forms.
- none - it is a culture of quality that is not viewed as a paper exercise and hence is second nature to our staff
- The internal audit team is very active and a schedule of audits, set up is followed very strictly and very few if any excuses are accepted for deviating from this schedule. People responding to findings is a problem as targets are not always met. Compliance is sometimes adhered to just to satisfy the audit. Otherwise people still go back to not doing things in accordance with standard.
- Time consuming however the benefits outweigh this factor.
- regular meetings. Ensuring all staff buy in. employee buy in is key.
- 1. The Cost involved in the implementation of QMS in the company.
  2. Staff resistance to change due to several requirements, they are expected to complied with in line with ISO 9001 regulations.
  3. Lack of Continuous training.
  4. Limited time available for staff to complete and submit the daily reports.
- Getting staff to adopt new procedures/filling of new documentation. Addressing training aspect for new staff.
- Buy in of all employees is an ongoing problem and need to be monitored and refreshed on a constant basis – it is also a constant training process that will be required


Figure 4.10 Word cloud summary of themes from Table 4.6

Challenges experienced in sustaining the ISO 9001 certification by the respondents indicated that the significant themes were time & monetary cost and staff compliance amongst these firms.

## 4.5 ISO 9001 Implementation Effectiveness

The results gauging the respondent's opinion on whether the ISO 9001 standard was being implemented effectively at their firm are also presented.

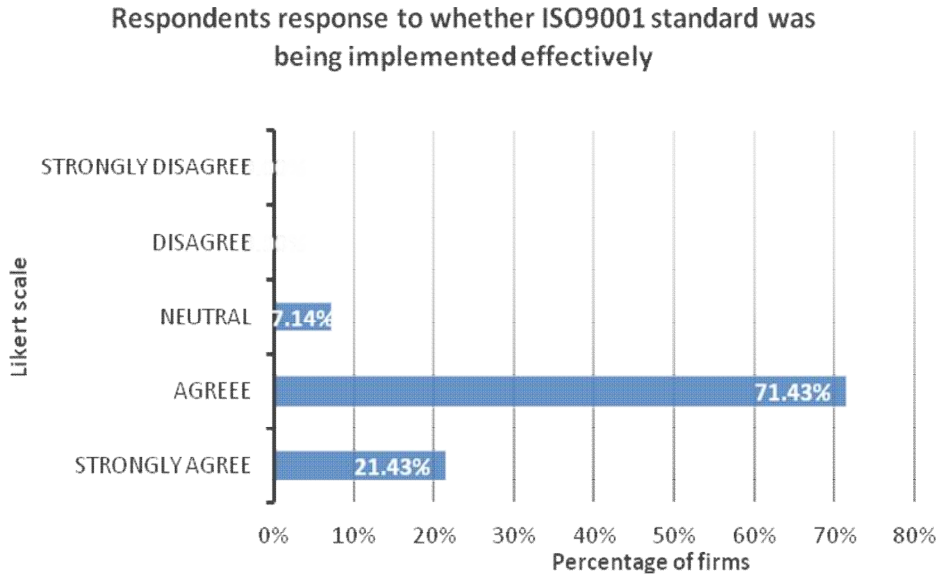


Figure 4.11: Respondents response to ISO 9001 implementation effectiveness at their firms

Respondent's opinions overwhelmingly show that they agreed that ISO 9001 standard was being implemented effectively at their firms.

A qualitative summary of reasons given by the respondents for their respective opinion on whether the ISO 9001 standard implementation was occurring effectively at their firms revealed the following:

Table 4.6 Summary of Respondents Reasons as to Whether ISO 9001 Standard was Being Implemented Effectively

| Firms That Strongly Agree | Firms That Agree | Firms That are Neutral |
|---|---|---|
| Some of the reasons given for this opinion included experiencing accelerated growth of the firm, conducting regular internal and external audits on systems, normalisation of quality as a way of conducting business, systematic functioning of operations, having an active internal auditing team, conforming to the ISO 9001 framework, improved record keeping, having a dedicated ISO 9001 auditor to check on systems and act as an early warning system resulting in less redesign and more satisfied clients. Some of the negative reasons include the continual challenge of filling project data, staff superficially comply with audit requirements so as to avoid findings and the attrition of trained staff. | Their reasons cited that improved work performance and everyone taking responsibility for their process as reasons for their rating. | Their reason attributed the prevalence of some staff members “cutting corners” in applying the standard. |

## 4.6 Suggestions for Improving Implementation of the ISO 9001 Standard

Respondents were afforded the opportunity to give comments on improving the implementation of the ISO 9001 standard. An analysis and subsequent summary of their suggestions revealed the following themes shown in Table 4.9:

Table 4.7 : Summary of Respondent's Suggestions for Improving Implementation of ISO 9001 Standard

- Two respondents suggested keeping the ISO standard simple and short. Having standard industry specific control documents linking the ISO standard would be useful.'
- Two respondents emphasised the importance of focusing on the firm's own/individual processes and systems in terms of the ISO standard certification.
- One respondent commented on the need for auditors from the certification bodies to be well versed and familiar with the industry they are auditing to improve the auditing process.
- Another respondent suggested that audit findings should be shared in internal company newsletter so as to encourage continued compliance.
- Continuous training of staff and creating continual awareness of the system was suggested by one respondent.
- Creating awareness at tertiary level of ISO 9001 was suggested by one respondent so that new graduates entering the industry would be easier to train.
- The involvement of senior staff as ISO project champions was suggested by two other respondents.
- Two other respondents suggested employing dedicated staff who would serve as internal auditors of the ISO 9001 system.
- A suggestion was made that the standard require an Internal audit once a year, a surveillance audit once every second year and a recertification audit once every 3 years.

## 4.7 Summary

The results presented show the respondents profile, as well as qualitative and quantitative data that was collected from the research tool. In the following chapter, these results are analysed and discussed in the context of the adopted research methodology. From this information, answers for the research objectives were provided. Chapter five therefore presents a discussion of the results.

# CHAPTER FIVE: DISCUSSION OF RESULTS

## 5.1 Introduction

This chapter analyses and discusses the results from chapter four. An initial discussion of the respondent's profile is presented followed by a discussion of the results in the context of the research objectives. The discussions are based only on the qualitative data. Quantitative data is ignored as the data is not statistically sufficient, in terms of sample size, to draw any meaningful conclusions from.

## 5.2 Respondents Profile

The respondents profile is simply meant to establish some demographic background and information regarding the research respondents. It is not used to infer conclusions with regard to the research objectives.

An analysis of the respondents' profile reveals that 50% of the respondents were owners or directors of the firms they represented. The other 50% were senior managers employed by the firms they worked for. Most of these respondents (42.86%) were aged between 36-45 years, followed by 28.57% of respondents aged 46-55 years with 21.43% of respondents having a minimum age of 56 years and 7.14 % of respondents aged from 26-35 years of age. No respondents were aged between 18-25 years of age.

The sizes of the firms varied in terms of employees from less than 5 staff members (14,29% of respondents), 6 to 20 staff (21.43% of respondents), 21 to 50 staff members (28.57% of respondents), and 51 to 200 staff members (35.71% of respondents). In terms of the National Small Business Act (Republic of South Africa. 1996) firms within the Financial and Business Services with less than 5 employees are regarded as Micro businesses. Firms with 6 to 10 employees are regarded as Very Small businesses and firms having 11 to 50 employees are regarded as Small sized businesses. Those with 51 to 100 employees ae categorized as Medium sized businesses.

The majority of firms (35.71%) have implemented the ISO 9001 standard for 4 to 7years. 28.57 % of the firms have implemented the standard for 1 to 3 years. Those firms that have implemented the standard for more than 8 years represent 21.43% of respondents. The balance of the firms has been implementing the standard for less than 12 months.

The respondents represent a middle aged (36-45 year) demographic or younger and belong primarily to medium to micro sized firms. Most of the firms have implemented the ISO 9001 standard for more than a year and therefore were able to have an adequate grasp of the implementation processes associated with the ISO 9001 standard.

## 5.3 Objective 1: Determine the perceptions of perceived benefits expected by consulting engineering firms when they implement ISO 9001

The literature and empirical reviews indicate that there are benefits to be experienced with regards to businesses and their performance as they implement ISO 9001 (Dick *et al.,* 2008). Dick *et al.,* (2008) explain that increased emphasis on internal quality and external quality dimensions lead to less waste and duplication of effort, reduced costs that improve competitiveness, reduce cost of sales thereby leading to increased profits. They couple this with improved service quality leading less customer attrition and consequent increase in sales opportunities and thereby increased profitability. Psomas *et al.,* (2015) reiterate that improved performance benefits are to be enjoyed from improved service quality, improved operational performance and improved market and linked financial performance.

Results from the research reveal that the qualitative analysis of the additional comments by respondents cited reduced design time, improved record keeping, standardised documentation, improved internal processes and an improved external perception to customers as positive factors (Table 4.2). However, it was also felt that the level of paperwork associated with the standard was excessive (Table 4.2).

Results from the quantitative analysis (Figure 4.5) reveal that from the research tool's listed positive factors the predominant perception was the improved competitive advantage and improved employee performance (92.9 % of respondents indicated this in both perception). This was followed by the perception of better work product and customer satisfaction experienced by 85.7% of respondents. 64.3 % of the respondents cited that they experienced an efficient use of time and improved marketing exposure. Only 57.1% of respondents mentioned that they experienced financial gains and an even smaller proportion (21.4%) of respondents felt that they experienced shorter work processes.

From the negative factors experienced (Figure 4.6), 64.3 % of respondents felt that they had longer work processes to deal with and 21.4 % of respondents felt that time was wasted during ISO 9001 implementation. 28.6% of the respondents felt that there was no change in marketing exposure experienced by them from the ISO 9001 implementation. Less than22% of respondents reported experiencing some form of monetary loss (14.3%) and reduced employee performance (7.1% of respondents).

The Likert scales show that only 50% of respondents agreed that the ISO 9001 standard enhanced both industry best practices (Figure 4.8) and competitive advantage (Figure 4.9). The statistical central tendency was for the respondents to agree that the ISO 9001 standard enhanced industry best practices. The statistical central tendency also showed that the respondents agree that the ISO 9001 standard enhanced competitive advantage.

The research results largely correlate with the expected benefits cited in the literature. Competitive advantage, improved employee performance and improved customer satisfaction were a common experience of the respondents. By virtue of the literature and theory this should translate into improved market share and subsequent financial gain (Dicken *et al.,*2008). Rusjan *et al.,* (2010) highlight improved customer satisfaction and retention as keys to increased sale volumes. Operational performance in the service industry was improved by effective ISO 9001 implementation (Evangelos *et al.*, 2013) that led indirectly to improved financial performance (Evangelos *et al.*, 2013). The negative effect of excessive documentation is also supported by Poksinka *et al.,* (2006) who showed that the misunderstanding of the role of documentation could lead to low levels of ISO 9001 implementation and thereby affect performance.

Perceptions of ISO 9001 are largely more positive than negative amongst the respondents from the consulting engineering sector in Durban.

## 5.4 Objective 2: Determine the challenges experienced in obtaining, implementing and sustaining the ISO 9001 certification.

Through a series of open ended questions respondents gave their opinions on the challenges that they experienced in obtaining, implementing and sustaining the ISO 9001 certification at their respective firms. This qualitative data was further analysed and dominant themes identified, including the frequency of their occurrence in the data set, and tabulated in Table 4.3 to Table 4.8.

With respect to firms obtaining the ISO 9001 certification the dominant themes, in order of declining occurrence, of the challenges encountered were as follows:

- Management and Staff buy-in (mind set change)
- Time and monetary cost
- Training of staff
- Availability of resources
- Employing a dedicated resource (to manage the ISO standard)
- Documenting existing procedures

According to the frequency of the above themes (Table 4.4), the statistical mode of challenges encountered when obtaining the ISO 9001 certification centred around Management and staff buy-in (mind-set change).

With respect to firms implementing the ISO 9001 certification the dominant themes, in order of declining occurrence, of the challenges encountered were as follows:

- Management and Staff buy-in (mind set change)
- Time and monetary cost
- Training of staff
- Availability of resources
- Employing a dedicated resource

According to the frequency of the above themes (Table 4.6), the statistical mode of challenges encountered when implementing the ISO 9001 certification centred around Management and staff buy-in (mind-set change).

With respect to firms sustaining the ISO 9001 certification the dominant themes, in order of declining occurrence, of the challenges encountered were as follows:

- Time and monetary cost
- Staff Compliance to standard
- Management and Staff buy-in (mind set change)
- Training of staff
- Employing a dedicated resource

According to the frequency of the above themes (Table 4.8), the statistical mode of challenges encountered when implementing the ISO 9001 certification centred around Time and monetary costs and Staff compliance to the standard.

With regards to the literature review Poksinka *et al.,* (2006) identified that the significant barrier to implementation of ISO 9001 in firms was the lack of buy-in from employees and more specifically lack of buy-in from top management. Other sources indicate that consistent top management involvement in ISO 9001 implementation along with direct employee involvement were foundations for successful implementation of the standard (Sampaio *et al.,* 2009, Ingason, 2015 Mata-Lima *et al.,* 2016 and Ivanova *et al.,* 2014). The observations with respect to top management buy-in and staff involvement correlate with the findings of the literature review.

The literature also identifies that high implementation and maintenance costs acted as barriers to successful implementation of the standard (Sampaio *et al.*, 2009). Added to this was a lack of resources and training availability (Ismyrlis *et al*., 2015) and a possible negative performance outputs from employees who misunderstood the standardization of work processes (de Vries, 2015). The respondent data also highlighted the time and monetary costs encountered during the implementation and sustaining phases of the ISO standard. Training of staff is an added cost of production that was also incurred. Staff compliance in terms of adopting the standard during day-to-day operations was also a challenge encountered.

It is evident that the impact of top management buy-in to the adoption of the ISO 9001 standard is significant as it impacts on employee engagement and their subsequent performance. Getting staff to buy-in to the standard adoption is also important as it will affect the firm's operational performance as well as the success of training measures aimed at

familiarizing the staff with the ISO 9001 standard. Time and monetary costs also need to be considered during the implementation of the ISO 9001 standard.

### 5.5 Objective 3: Determine the effective implementation of ISO 9001

The quantitative results in Figure 4.9 show that the respondents were categorised as having strongly agreed, agreed or were neutral on whether the ISO 9001 standard was being effectively implemented at their firms. The data shows that the majority of respondents (the statistical mode of the data) agreed that the ISO 9001 standard was being effectively implemented at their firms. The data shows that 21.4 % of the respondents strongly agreed that ISO 9001 implementation was conducted effectively. 71.4% of respondents agreed that the standard was being implemented effectively at their respective firms. Even though none of the respondents disagreed there was a 7.1% of respondents that took a neutral position on the issue. The fact that most of the respondents agreed instead of strongly agreeing on the effective implementation of the standard could imply that there are some barriers to the effective implementation of the standard.

Positive feedback from the qualitative data presented in Table 4.9 showed that improved work performance, normalization of quality protocols into business processes, improved record keeping and systematic operating of processes gave evidence of the effective implementation of the standard. Sampaio *et al*., (2009) similarly state that some of the commonly stated ISO 9001 certification internal benefits are; productivity improvements, quality awareness improvements, delivery times improvements, internal organisation improvements, nonconformities decreases, internal communication improvements and product quality improvement.

However, staff compromising on procedures and the superficial compliance to audits were sources of concern as these behaviours may hinder successful effective implementation of the standard. In agreement, Ingason, (2015) confirms that barriers to effective ISO 9001 implementation includes employee resistance to organisational change and difficulty in performing internal audits. Resistance to organisational change according to Sampaio *et al*., (2016) can be caused by;

- lack of employee involvement
- lack of information to new organisational roles and new systems and changes
- lack of motivation on the implementation process

In correlation with this, Ivanova *et al*., (2014) confirm that employee's positive attitude towards the standard and employee involvement enable the effective implementation of the standard.

### 5.6 Objective 4: Lessons Learned

The benefits and challenges experienced by the Durban based firms participating in the research appear to be similar to those experienced elsewhere in the world as indicated by the literature. The benefits of improved employee performance, improved competitive advantage, better work product, improved customer satisfaction, more efficient use of time, improved marketing exposure and financial gain, in the Durban context, are seen in other parts of the world. Psomas *et al.,* (2015), writing from a Greek context, reiterate that improved performance benefits are to be enjoyed from improved service quality, improved operational performance and improved market and linked financial performance. Rusjan *et al.,* (2010), from a Slovenian context, highlight improved customer satisfaction and retention as keys to increased sale volumes.). Aba *et al.,* (2016), in an American context, note the improved performance by ISO certified firm over non-certified firms.

In terms of challenges experienced by Durban based firms, the research showed that top management buy in coupled with employee buy in were fundamental for effective performance of the ISO 9001 standard. Sampaio *et al.,* (2009), Ingason, H.T. (2015) Mata-Lima *et al.*, (2016) and Ivanova *et al.,* (2014) support the view of consistent top management and employee participation as evidenced from the authors' Portuguese, Icelandic, Brazilian and American research context.

The structure of the ISO 9001 standard is a processed based structure that espouses continual improvement of the quality management system (as explained in section 2.1.4). The research respondents shared their suggestions for improving the ISO 9001 implementation based along the following themes:

- Auditors should be familiar with the industry they are investigating. A similar concern is expressed by Sampaio *et al.,* (2009) over auditor competency and ethics of certification bodies
- Simplifying the standard with the possibility of industry specific control documents being created by ISO.

- Employing full time staff as internal auditors of the firm's ISO standard.
- Continuous training and awareness of staff on the ISO system.
- Appointing senior staff as ISO champions within a firm to assist with consistent application of the standard
- A process based approach to understating the different steps involved in a firm's operational performance is suggested by Carmignani G, (2008).
- Time and cost of implementing the ISO standards could also be approached as variables in project planning with definite durations and monetary value (Ingason, 2015)

The suggestions are not meant to be prescriptive but should rather be evaluated in the context of individual firms. The suggestions are in keeping with the fundamental tenants of quality management principles, that of continual improvement.

The study has shown similarities existing between Durban based firms that adhere to ISO 9001 and organisations in other parts of the world. Insight from other firms in other countries should assist Durban based firms in improving implementation of ISO 9001 standards. In a comparable way, Durban based firms could also assist other firms in implementing recommendations for successful ISO 9001 implementation.

## 5.7 Summary

A discussion of the results revealed that the perceived benefits and challenges experienced in consulting engineering firms in implementing the ISO 9001 standard was similar to experiences found in the literature. This satisfied the research's first and second objectives. A brief discussion of the results relating to the third objective of determining the effectiveness of the ISO 9001 standard implementation indicated that their being positive factors of implementation of the standard that there may still be barriers to its effective implementation. The discussion on lessons learned based on answering the fourth objective of discussing possible improvements to the implementation of the standard was achieved. These observations are compiled and presented as part of the conclusions and recommendations of the research in the chapter that follows.

# CHAPTER SIX: CONCLUSION & RECOMMENDATIONS

## 6.1 Introduction

The aim of this study is to assess the adoption of the ISO 9001 standard in selected consulting engineering firms in Durban and the perceptions associated with using this standard. The perceptions of owners, directors or senior managers responsible for the ISO 9001 standard at their firms, have been collected through a qualitative and selectively quantitative study to address the main objectives of the study. These objectives look at the perceived benefits and challenges of implementing the ISO 9001 standard at these firms. This chapter addresses in summation how the research problem and the four objectives have been answered by findings from the literature and from the research conducted. In a systematic format, each of the objective's findings are presented, conclusions are discussed, and recommendations are presented. These are then collated to provide concluding remarks that inform the research problem and provide final recommendations to the research problem. Recommendations for future studies are also presented.

## 6.2 Objective 1: Determine the perceptions of perceived benefits expected by consulting engineering firms when they implement ISO 9001

### 6.2.1 Findings from Literature

The literature and empirical review revealed that businesses that implemented ISO 9001 standards with an emphasis on increasing quality within their organisations lead to less waste, less duplication of effort, improved service quality leading to less customer attrition and consequent increase in sales opportunities and thereby increased profitability. Improved performance benefits from improved service quality, operational performance resulted in improved market share and financial performance (Psomas *et al.,* 2015, Dick *et al.,* 2008).

### 6.2.2 Findings from Research

Results from the research revealed that the respondents cited reduced design time, improved record keeping, standardised documentation, improved internal processes and an improved external perception to customers as positive factors. Competitive advantage, improved employee performance, better work product, efficient use of time, improved marketing exposure and customer satisfaction were also experienced.

However, the level of excessive paperwork was cited as a negative factor along with the perception that work processes were longer. A small percentage of respondents felt that there was no change in marketing exposure.

### 6.2.3 Conclusion

The research results largely correlate with the expected benefits cited in the literature. Competitive advantage, improved employee performance and improved customer satisfaction were a common experience of the respondents. This should translate into improved market share and subsequent financial gain. Improved customer satisfaction, improved staff retention as keys to increased sale volumes (Dicken *et al.,* 2008, Rusjan *et al.,* 2010). Improved operational performance in the service industry led to improved financial performance (Evangelos *et al.*, 2030). The negative effect of excessive documentation is also supported by Poksinka *et al.,* (2006) who showed that the misunderstanding of the role of documentation could lead to low levels of ISO 9001 implementation and thereby affect performance. Perceptions of ISO 9001 are largely more positive than negative amongst the respondents from the consulting engineering sector in Durban.

### 6.2.4 Recommendations

The paperwork involved with ISO 9001 standards implementation should be streamlined so as not to increase the length of time it takes to complete and closeout work processes. Continual training of both staff and management should yield consistent daily operational performance and improved outcomes for the firm.

## 6.3 Objective 2: Determine the challenges experienced in obtaining, implementing and sustaining the ISO 9001 certification.

### 6.3.1 Findings from Literature

The literature review identified that the significant barrier to implementation of ISO 9001 in firms was the lack of buy-in from employees and more specifically lack of buy-in from top management Poksinka *et al.,* (2006). Consistent top management involvement along with direct employee involvement are foundations for successful implementation of the ISO 9001standard (Sampaio *et al.,* 2009, Ingason, 2015 Mata-Lima *et al.,* 2016 and Ivanova *et al.,* 2014). High implementation and maintenance costs acted as barriers to successful implementation of the standard (Sampaio *et al.*, 2009). Added to this was a lack of resources

and training availability (Ismyrlis *et al*., 2015) and negative performance outputs from employees who misunderstood the standardization of work processes (de Vries, 2015).

### 6.3.2 Findings from Research

The research showed that with respect to firms obtaining, implementing and sustaining the ISO 9001 standard the following challenges were encountered:

- Management and Staff buy-in (mind set change)
- Time and monetary cost
- Training of staff
- Availability of resources
- Employing a dedicated resource (to manage the ISO standard)
- Documenting existing procedures
- Time and monetary cost

### 6.3.3 Conclusion

It is evident that the impact of top management buy-in to the adoption of the ISO 9001 standard is significant as it impacts on employee engagement and their subsequent performance. Getting staff to buy-in to the standard adoption is also important as it will affect the firm's operational performance as well as the success of training measures aimed at familiarizing the staff with the ISO 9001 standard. Time and monetary costs also need to be considered during the implementation of the ISO 9001 standard.

### 6.3.4 Recommendations

Continual support from top management for the ISO 9001 standard must be part and parcel of daily operational functions of a firm. Management team talks with employees on the issues arising from implementing the standard should be regularly reviewed and not just during an impending audit.

## 6.4 Objective 3: Determine the effective implementation of ISO 9001

### 6.4.1 Findings from Literature

The literature reveals that effective implementation has significant benefits for company profitability and process efficiency. Within the company's structure, effective ISO 9001 implementation can result in reduced costs due to less rework and reduced scrap coupled with

improved productivity (Summers 2009). There is also improved profitability because of reduced production costs was found to be an added benefit (Rusjan *et al.*, 2010). Dick, Heras and Casadesús (2008) provide a causal model that relates the expected improvements from quality management certification leading to improved business performance.

The barriers to effective implementation include lack of employee and management buy-in, documentation control, work process misunderstandings and high costs of implementation. The significant barrier encountered with the implementation of the ISO standard included a lack of buy-in from the employees and buy-in from top management (Poksinska *et al*, 2006). Lack of commitment by quality managers leads to a lack of importance placed on the quality management system tool by employees (Poksinska *et al.,* 2006). Poksinska *et al.,* (2006) also identified a negative emphasis on documentation and a misunderstanding of the role of documentation contributed to low levels of implementation. The other barriers identified were high implementation and maintenance costs, lack of industry specific knowledge by auditors, ethical issues ascribed to certification bodies and differing interpretation of standards among certification bodies Sampaio *et al.,* (2009).

### 6.4.2 Findings from Research

The quantitative results show that the majority of respondents (the statistical mode of the data) agreed that the ISO 9001 standard was being effectively implemented at their firms. Positive feedback from the qualitative data showed that improved work performance, normalization of quality protocols into business processes, improved record keeping and systematic operating of processes gave evidence of the effective implementation of the standard. However, staff compromising on following procedures and the superficial compliance to audits were sources of concern as these behaviours may hinder effective implementation of the standard.

### 6.4.3 Conclusion

There is consensus between the literature and research findings that effective implementation is only as good as the employees and managers that adhere to the requirements of the standard. Therefore, the implementation of ISO 9001 as indicated by the research respondents is considered effective based on the perceptions that employee cooperation and commitment to implementing the standard is the key success factor. The barriers to implementation are similar noted to that in the literature. However, a point of difference in the research findings

is the effect of superficial compliance to keeping up with audit requirements alone do not foster improvement and greater levels of implementation effectiveness.

### 6.4.4 Recommendation

Based on the responses of this data set, it is recommended to enhance employee and top management buy-in is to conduct more training on the ISO 9001. This will likely benefit the company's implementation as it will focus on continual improved and not just compliance.

## 6.5 Objective 4: Lessons Learned

### 6.5.1 Finding from literature

The findings from the literature indicate a common theme of lessons for effective implementation. Psomas *et al.,* (2015), writing from a Greek context, reiterate that improved performance benefits are to be enjoyed from improved service quality, improved operational performance and improved market and linked financial performance. Rusjan *et al.* (2010), from a Slovenian context, highlight improved customer satisfaction and retention as keys to increased sale volumes.). Aba *et al.,* (2016), in an American context, note the improved performance by ISO certified firm over non-certified firms.

### 6.5.2 Findings from Research

The research respondents shared their suggestions for improving the ISO 9001 implementation based along the following themes:

- Auditors should be familiar with the industry they are investigating. A similar concern is expressed by Sampaio *et al.*, (2009) over auditor competency and ethics of certification bodies
- Simplifying the standard with the possibility of industry specific control documents being created by ISO.
- Employing full time staff as internal auditors of the firm's ISO standard.
- Continuous training and awareness of staff on the ISO system.
- Appointing senior staff as ISO champions within a firm to assist with consistent application of the standard
- A process based approach to understating the different steps involved in a firm's operational performance is suggested by Carmignani (2008).

- Time and cost of implementing the ISO standards could also be approached as variables in project planning with definite durations and monetary value (Ingason, 2015).

### 6.5.3 Conclusion

The study has shown similarities existing between Durban based firms that adhere to ISO 9001 and organisations in other parts of the world. Insight from other firms in other countries should assist Durban based firms in improving implementation of ISO 9001 standards.

### 6.5.4 Recommendation

In an analogous way to the literature findings, Durban based firms could assist other firms in implementing recommendations for successful ISO 9001 implementation. A community of practice approach to ISO implementation through voluntary associations is a potential option for addressing sharing lessons learnt and best practice advice.

## 6.6 Concluding Remarks

This study looked at researching the perceptions of selected consulting engineering firms in Durban with respect to benefits and challenges experienced in implementing the ISO 9001 standard. The selected firm's respondent's data and literature review identified relevant themes that were either beneficial or posed as challenges to the obtaining, implementing and sustaining of the ISO 9001 certification.

The positive themes of improved competitive advantage, employee performance, work product, customer satisfaction, financial gain, marketing exposure and financial gain agreed with the literature. Challenges such as lack of management buy-in, time and financial cost also agreed with the literature review. These themes tie in with the experience of other firms outside of South Africa as indicated from the literature review.

A positive outlook on industry best practice and competitive advantage supported the view of effective implementation of the standard. However, some recommendations to further assist successful implementation of the standard are also proposed. These include ensuring management support, continual staff training, acquiring specific staff for ISO purposes and appropriate record keeping.

The objectives of determining benefits, challenges, levels of effective implementation of ISO 9001 were satisfied. Coupled to this was the objective of proposing improvements to the ISO 9001 standard implementation.

## 6.7 Implications of this Research

Taking the literature review and the results obtained in the study into consideration, the research shows that consulting engineering firms are benefiting from the use of ISO 9001 implementation within their businesses. The challenges identified and recommendations from the findings of the research should assist consulting engineering firms to be more effective in implementing the ISO 9001 standard. Firms that are not yet ISO 9001 certified will be encouraged to see that there are more benefits than challenges to obtaining the ISO 9001 certification.

## 6.8 Recommendations to Solve the Research Problem

The following recommendations should assist the stakeholders in relation to the research problem:

- The engineering firms that participated in the research exhibited a commitment to implementing the ISO 9001 standard. To assist them during audits and the daily operational requirements it is suggested that industry specific standard documentation be developed for the engineering sector. This should assist in alleviating the burden of excessive generic documentation.

- There should also be a tangible commitment from management in supporting the ISO 9001 daily implementation. The additional employment of separate ISO dedicated staff should help with overall cost reductions as the organization focuses on increasing operational efficiency in its core business areas.

- Continual training of staff throughout the year and not just to periods of time leading up to audits will be fundamental in changing employees mind sets on how the firm operates.

- A record/database of cost and time associated with ISO standard implementation should be kept and analysed along other business performance indicators to gauge the

time and profitability required for effective ISO 9001 implementation and institutionalization.

## 6.9 Recommendations for Future Studies

The scope and scale of the research was small. Future research could look at expanding the scope of respondents to include employees so that a broader picture of perceptions related to ISO 9001 implementation within consulting engineering firms in Durban and beyond can be achieved.

## 6.10 Summary

In conclusion, the implementation of the ISO 9001 standard amongst consulting engineering firms in Durban has brought about benefits and challenges to the firms. The study has shown that these benefits and challenges coupled with their effective implementation has more positive than negative impact on the firms concerned. Suggestions have been identified by the stakeholders to assist with the implementation of the standard.

The study addressed and achieved its objectives, in spite of the many challenges of investigating the perceived benefits and challenges in applying the ISO 9001 standard to consulting engineering firms located in the Durban area.

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# APPENDICES

## **Appendix 1:** Informed Consent Letter

**Informed Consent Letter 3C**

**UNIVERSITY OF KWAZULU-NATAL**
**GRADUATE SCHOOL OF BUSINESS AND LEADERSHIP**

Dear Respondent,

**MBA Research Project**
**Researcher**: Fred Sengendo Sennoga (071 202 6508)
**Supervisor**: Mr. Alec sable (082 334 4477)
**Research Office**: Ms P Ximba 031-2603587

I am, **FRED SENGENDO SENNOGA** an MBA student, at the Graduate School of Business and Leadership, of the University of KwaZulu-Natal. You are invited to participate in a research project entitled, "**The perceptions of ISO 9001 implementation in selected consulting engineering firms in Durban**."

The aim of this study is to: **determine the impact of factors linked with implementing ISO 9001 standard and certification in the consulting engineering sector of firms located in the Durban area.**

Through your participation, I hope to understand **the potential benefits and pitfalls of implementing the ISO standard amongst consulting engineering firms**. The results of the focus group are intended to contribute to the **determination of trends and lessons that could advise future and present ISO 9001 certified consulting engineering firms in their implementation of the standard and subsequent sustainability issues.**

Your participation in this project is voluntary. You may refuse to participate or withdraw from the project at any time with no negative consequence. There will be no monetary gain from participating in this survey/focus group. Confidentiality and anonymity of records identifying you as a participant will be maintained by the Graduate School of Business and Leadership, UKZN.
If you have any questions or concerns about completing the questionnaire or about participating in this study, you may contact me or my supervisor at the numbers listed above.

The survey should take you about **25** minutes to complete. I hope you will take the time to complete this survey.

Sincerely

Fred S Sennoga

Investigator's signature_____ Date_____
***This page is to be retained by participant***

**UNIVERSITY OF KWAZULU-NATAL**
**GRADUATE SCHOOL OF BUSINESS AND LEADERSHIP**

**MBA Research Project**

**Researcher**: Fred Sengendo Sennoga (071 202 6508)
**Supervisor**: Mr. Alec Bozas (082 334 4477)
**Research Office**: Ms. P Ximba 031-2603587

**CONSENT**

I…… (full names of participant) hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participating in the research project.

I understand that I am at liberty to withdraw from the project at any time, should I so desire.

SIGNATURE OF PARTICIPANT DATE

……

***This page is to be retained by researcher***

# Appendix 2: Sample Research Tool

**RESEARCH QUESTIONNAIRE**

**SECTION A: Respondent's Background Information:**

1. Name of firm/employer? _____

2. What is your position in the firm? *(please tick the appropriate box)*

| Owner/Partner/Director | Senior Manager |
|---|---|

3. What is your Age?

| 18-25yrs | 26-35yrs | 36-45yrs | 46-55yrs | 56yrs + |
|---|---|---|---|---|

4. Approximate number of staff at current firm/branch?

| < 5 staff | 6 to 20 staff | 21 to 50 staff | 51 to 200 staff | > 200 staff |
|---|---|---|---|---|

**SECTION B: Firm's ISO 9001 Certification background**

1. Is the firm currently ISO 9001

| Yes | No |
|---|---|

certified?

a) If you answered NO to question 1, are you currently renewing or applying for ISO 9001 certification?

| Yes | No |
|---|---|

b) If you answered YES to question 1, how long has the firm implemented the ISO 9001 standard?

| < 3 months | 4 to 12 months | 1 to 3 yrs | 4 to 7yrs | > 8 yrs |
|---|---|---|---|---|

**SECTION C: Perceptions of ISO 9001 Implementation**

*1.* From your experience what are the positive or negative factors of implementing the ISO 9001 standard certification? *(tick the boxes you agree with below)*

| | |
|---|---|
| Financial gain | Financial loss |
| Improved employee performance | Reduced employee performance |
| Improved Marketing exposure | No change in marketing exposure |
| Customer satisfaction | Reduced customer satisfaction |
| Better work product | Reduced work product |
| Shorter work processes | Longer work processes |
| Improved competitive advantage | Reduced competitive advantage |
| Efficient use of time | Wasted time |

1.1. In your opinion are there any other positive or negative factors experienced in the implementation of ISO 9001 certification at your firm? (*please use the space below*)

| |
|---|
| - |

1.2. In your opinion does the ISO 9001 standard enhance industry best practices? *(please tick one box below)*

| Strongly Agree | Agree | neutral | Disagree | Strongly Disagree |
|---|---|---|---|---|

*1.3.* In your opinion does the standard enhance competitive advantage? *(please tick one box)*

| Strongly Agree | Agree | neutral | Disagree | Strongly Disagree |
|---|---|---|---|---|

2. In your opinion what are the challenges experienced in **obtaining** the ISO 9001 certification at your firm? (*please use the space below*)

| |
|---|
| - |

3. In your opinion what are the challenges experienced in **implementing** the ISO 9001 certification at your firm? (*please use the space below*)

| |
|---|
| - |

4. In your opinion what are the challenges experienced in **sustaining** the ISO 9001 certification at your firm? (*please use the space below*)

| |
|---|
| - |

*5.* Is the standard being implemented effectively at your firm? *(please tick one box)*

| Strongly Agree | Agree | neutral | Disagree | Strongly Disagree |
|---|---|---|---|---|

5.1. What reason/s can you give for your previous answer? (*please use the space below*)

| |
|---|
| - |

***6.*** In your opinion what can be improved in implementing the standard? (*please use the space below*)

| |
|---|
| - |

***End of questionnaire & Thank You!***

**Appendix 3:** Ethical Clearance Approval Letter


12 June 2017

**Mr Fred Sengendo Sennoga (971119588)**
**Graduate School of Business & Leadership**
**Westville Campus**

Dear Mr Sennoga,

**Protocol reference number: HSS/0487/017M**
**Project title:** The perceptions of ISO 9001 implementation in selected consulting engineering firms in Durban

**Full Approval – Expedited Application**

In response to your application received on 05 May 2017, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and FULL APPROVAL for the protocol has been granted.

**Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number.**

**PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.**

**The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.**

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

[redacted]
.....
**Dr Shenuka Singh (Chair)**

/ms

Cc Supervisor: Mr Alec Bozas
Cc Academic Leader Research: Dr Muhammad Hoque
Cc School Administrator: Ms Zarina Bullyraj

**Humanities & Social Sciences Research Ethics Committee**
**Dr Shenuka Singh (Chair)**
**Westville Campus, Govan Mbeki Building**
**Postal Address:** Private Bag X54001, Durban 4000
**Telephone:** +27 (0) 31 260 3587/8350/4557 **Facsimile:** +27 (0) 31 260 4609 **Email:** singhsh@ukzn.ac.za / snymanm@ukzn.ac.za / mohunp@ukzn.ac.za
**Website:** www.ukzn.ac.za

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## Appendix 4: Turnitin Report