THE IMPACT OF CULTURE ON THE SUCCESSFUL IMPLEMENTATION OF QUALITY MANAGEMENT SYSTEMS.

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THE IMPACT OF CULTURE ON THE SUCCESSFUL IMPLEMENTATION OF QUALITY MANAGEMENT SYSTEMS.

by

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DECLARATION

I, Vathiswa Lungelwa Ludidi, hereby declare that the contents of this dissertation represent my own unaided work, and that the dissertation has not previously been submitted for academic examination towards any qualification. Furthermore, it represents my own opinions and not necessarily those of the Cape Peninsula University of Technology.

	14 APRIL 2010
Signed	**Date**

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ABSTRACT

Irrespective of the nature of organisations, they all face a certain amount of uncertainty and risk. In order to maintain resilience, competitiveness and performance, organisations must have a system in place to manage the risks associated to their organisations. The challenge is to determine how much risk and uncertainty is acceptable, and how to cost effectively manage the risk and uncertainty while meeting the organisation's strategic and operational objectives. For many large organisations, quality or so called 'customer perceived quality', has become an issue of survival. Furthermore, increased competitiveness is necessary in order to become the obvious choice for the customer.

Corporations must have long term goals and Quality Management Systems serve as organised mechanisms to manage quality, effectiveness and competitiveness involving every one at all levels of the organisation. An understanding of culture in organisations can thus offer insight into individual and group behaviour, and leadership. Furthermore, it can help to explain not just 'what' happens in an organisation, but 'why' it happens. Companies view culture as something to be influenced to achieve organisational goals of productivity and profitability. Attempts to change the culture of an organization, may meet with varied levels of success.

The emphasis on quality building products, have been the focus of the construction industry in South Africa. As a supplier of extruded aluminium profiles to the building industry, Hulamin Extrusions is also faced with typical challenges representative of the industry and as a result, the following aspects would be subjected to research scrutiny:

- Introduction of a Quality Management System.
- The challenges of organisational culture.
- The need for change management.
- Facilitating the implementation of the system.
- Continuous Improvement.

The researcher anticipates finding ways to improve organisational culture, which in turn would facilitate quality improvement within the organisation.

TABLE OF CONTENTS

LIST OF APPENDIXES

AN OVERVIEW OF THE SOUTH AFRICAN ALUMINIUM INDUSTRY

LIST OF TABLES

LIST OF FIGURES

GLOSSARY OF TERMS

Quality Management System (QMS)	Is defined as a set of policies, processes and procedures required for planning and execution (production/ development/service) in the core business area of an organisation.
International Organisation for Standardisation (ISO)	A non-governmental organisation, established to promote the development of standardisation and related activities in the world with a view to facilitating the international exchange of goods and services.
Total Quality Management (TQM)	Refers to a set of management practices throughout the organisation, geared to ensure the organisation consistently meets or exceeds customer requirements, places strong focus on process measurement and controls as means of continuous improvement.
Culture	According to Siakas and Geogiadou (2002: **Online**) citing Hofstede **s.a.**, "Culture is the collective programming of the mind, which distinguishes the members of one human group from another".
Organisational Culture	Is mainly created and maintained into existing frameworks by the founders and the leaders of an organisation through their value system.
Change Management	Refers to the process during which the changes of a system are implemented in a controlled manner. A structured approach to transitioning individuals, teams, and organisations from a current state to a desired future state.

CHAPTER 1: SCOPE OF THE RESEARCH

1.1 INTRODUCTION AND MOTIVATION

The history of quality management from mere 'inspection' to 'Total Quality Management' and its modern branded interpretations such as 'Six Sigma', has led to the development of essential processes, ideas, theories and tools (Chapman, 2008:**Online**). These processes, ideas, themes and tools are central to organisational development, change management and performance improvement generally desired for individuals, teams and organisations. They map to organisational commitment to quality, and commitment to quality underpinned by the appropriate organisational culture.

According to Chapman (2008:**Online**), quality management resulted from the work of American quality gurus in the likes of Joseph Juran, Edward Deming and Armand Feigenbum in the 1950's. Karou Ishikawa, Genichi Taguchi and Shigeo Shingo are the Japanese quality gurus who further developed and extended the early American quality ideas and models. In the 1970's – 80's, Phillip Crosby and Tom Peters, the Western American gurus further extended the Quality Management concepts and developed the use of Plan, Do, Check, Act (PDCA) cycle, Pareto Analysis and Process Control charts.

According to Chapman (2008:**Online**), an organisational commitment to quality and the importance of communicating it together with the appropriate organisational culture, essential for the effectiveness of a Quality Management System (QMS). People are fundamental to the success of the concept and their motivation and commitment are critical elements thereof. According to Foster, (2001:61), while international trade has existed for a long time, international diversity has grown exponentially since World War II, with organisations needing to cope more now than in the past. This has been increased due to an emphasis on international trade with companies seeking new markets and as a result of globalisation.

The smallest site of Hulamin Extrusions in Epping Cape Town was given a mandate to implement ISO 9001 as a (QMS) used by the whole Hulamin group. The researcher intends to provide insight into how the organisation could improve its overall customer satisfaction by addressing obstacles pertaining to organisational culture as it pertains to the implementation of ISO 9001:2008 certification.

1.2 BACKGROUND TO THE RESEARCH PROBLEM

The need to implement a QMS challenges top management to revise their policies and procedures. Senior leadership's constant role-modelling of these principles and their creation of a supportive environment to live such principles are necessary for the organisation to reach its true potential. The management of cultural diversity is becoming a significant priority for companies of all sizes, not only for multinational organisations.

The potential of an organisation is realised through its people's enthusiasm, resourcefulness and participation. An organisation's agility depends on the way people accept the need for change and respond rapidly with sustainable improvements (Jantii, 2005:3-4). To improve the outcome, the system and its associated processes needs to be improved. Specific processes and/or whole systems must be studied and changed in order to achieve predictable long-term benefit.

1.3. STATEMENT OF THE RESEARCH PROBLEM

The research problem to be researched within the ambit of the dissertation, reads as follows: "The influence of culture is adversely impacting on the success of QMS implementation".

1.4. THE RESEARCH QUESTION

The research question to be researched within the ambit of the dissertation, reads as follows: "What mechanisms can be introduced to facilitate the implementation of QMS in an organisation, impacted upon by organisational culture?"

1.5. INVESTIGATIVE (SUB-) QUESTIONS

The investigative questions to be researched in support of a research question reads as follows:

- Does top management understand the extent to which policies and procedures are required to change in order to comply with the requirements of the QMS?
- Is top management aware of the extent to which they may need to improve on the current infrastructure to establish process conformance to the QMS, and therefore customer requirements?
- To what extent should employees take ownership of the system to facilitate implementation of the required changes?
- To what extent are employee tasks required to be changed or revised in order to establish proof of process and product conformity to customer requirements?

1.6. PRIMARY RESEARCH OBJECTIVES

The primary research objectives of this dissertation are the following:

- To identify the impact of culture on the implementation process of a QMS.
- To assess the challenges of organisational culture when implementing a QMS.
- To establish the need for change management when implementing a QMS.
- To make recommendations to mitigate the research problem.

1.7. THE RESEARCH PROCESS

The research process provides insight into the process of 'how' the research will be conducted from developing the proposal to submitting the dissertation. Remenyi, Williams, Money and Swartz (2002:64-65), explains that the research process as consisting of eight specific phases, which will be applied to this research study. The phases include:

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

1.8 RESEARCH DESIGN AND METHODOLOGY

According to Collis and Hussey (2003:68-70), case studies are often described as explanatory research used in areas where there are few theories or a deficient body of knowledge. In addition, the following types of case studies can be identified:

- **Descriptive case studies:** Where the objective is restricted to describing current practice.
- **Illustrative case studies:** Where the research attempts to illustrate new and possible innovative practices adopted by particular companies.
- **Experimental case studies:** Where the research examines the difficulties in implementing new procedures and techniques in an organisation and evaluating the benefits.
- **Explanatory case studies:** Where existing theory is used to understand and explain what is happening.

According to Yin (1994:1), case study research can be used in many situations including:

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

In this research study, a combination of 'descriptive' and 'explanative' research will be conducted.

1.9 DATA COLLECTION DESIGN AND METHODOLOGY

Primary data or evidence will be collected using questionnaires, which fall within the ambit of a broader definition of 'survey research' or 'descriptive survey'. The concept of survey is defined by Remenyi *et al.* (2002:290) as: "…the collection of a large quantity of evidence usually numeric, or evidence that will be converted into numbers, normally by means of a questionnaire. A questionnaire is a list of carefully structured questions, chosen after considerable testing with a view to elicit reliable responses from a chosen sample. The aim is to establish what a group of participants do, think or feel. A positivistic approach suggests structured 'closed' questions, while a phenomenological approach suggests unstructured 'open-ended' questions. In this research a positivistic approach will be used. The evidence collected could suggest ways in which the organisation could improve the strategy.

1.10 DATA VALIDITY AND RELIABILITY

According to Collis and Hussey (2003:186), 'validity' is concerned with the extent to which the research findings accurately represents what is happening. More specific, whether the data is a true picture of what is being studied. According to Cooper and Schindler (2006:318-320), three major forms of validity can be identified, namely 'content validity', 'criterion-related validity' and 'construct validity'.

Reliability (also referred to as 'trustworthiness'), is concerned with the findings of the research (Collis & Hussey, 2003:186). The findings can be said to be reliable if you or anyone else repeated the research and obtained the same results. There are three common ways of estimating the reliability of the responses to questions in questionnaires or interviews, namely:

- Test re-test method, which will be used in this dissertation, the
- split halves method, and the
- internal consistency method.

1.11 ETHICS

In the context of research, according to Saunders, Lewis and Thornhill, (2001:130), "… ethics refers to the appropriateness of your behavior in relation to the rights of those who become the subject of your work, or are affected by it". The following ethics will be observed in the research study:

- **Informed consent:** Participants will be given the choice to participate or not to participate, and furthermore be informed in advance about the nature of the study.
- **Right to privacy:** The nature and quality of participants' performance will be kept strictly confidential.
- **Honesty with professional colleagues:** Findings must be reported in a complete and honest fashion, without misrepresenting what has been done or intentionally misleading others as to the nature of it. Data will not be fabricated to support a particular conclusion.
- **Confidentiality/Anonymity:** In addition to the above confidentiality or anonymity will be offered to participants, as this will lead to participants giving more open and honest responses.

1.12 RESEARCH ASSUMPTIONS

The following assumptions apply to the proposed research:

- Operators at Hulamin Extrusions work based on their experience as opposed to following documented standard operating procedures.
- Hulamin employees have developed bad working habits and blame 'shifting' for inefficiencies.

1.13 RESEARCH CONSTRAINTS

The following constraints apply to the research:

- Accessibility of documentation used in core departments.
- The reliability of head of departments (supervisors) in recording the required information.

1.14 CHAPTER AND CONTENT ANALYSIS

The following chapter and content analysis will be applicable to the research study:

Chapter 1 - Scope of the research: In this chapter, a high level background will be provided of the scope of the research taking place within the Manufacturing Industry in an aluminium extrusion plant. The research process will be explained and the research design and methodology elaborated upon. The research constraints will be listed, and an overview of the chapter and content analysis of the dissertation will be provided. The chapter will be concluded with a list of primary research objectives.

Chapter 2 – Background and insight to the research environment: In this chapter, the requirements of the QMS implemented at Hulamin Extrusions will be analysed in detail. External and internal factors will be considered including the issue of culture, which impact the challenges of the construction industry. The focus will in particular be centered on the impact of top management in cutting costs on resources required for the successful implementation of the QMS.

Chapter 3 - Quality management (A literature review): In this chapter, a literature review will be conducted on the concept of Quality Management Systems and implementation thereof.

Chapter 4 - Data collection design and methodology: In this chapter, the survey environment will be elaborated upon. The approach to data collection will be explained and the process and product measurements defined. The measurement scales to be used in the survey and the survey design will be explained in detail. The chapter will be concluded with a list of survey questions to be posed to the target organisation.

Chapter 5 - Data analysis and interpretation of results: In this chapter, data gleaned from the survey conducted within the ambit of Chapter 4, will be analysed in detail and interpreted in terms of the primary theme of the dissertation. In addition, the results from the survey will be mapped to the literature review conducted within the ambit of Chapter 3.

Chapter 6 – Conclusion: In this chapter, the research will be concluded. The research design and methodology, the research process, the research problem, research question and investigative questions and survey findings are revisited and final conclusions drawn. In addition, a holistic reflective overview will be provided of the research.

1.15 SIGNIFICANCE OF THE PROPOSED RESEARCH

The significance of the proposed research is vested in the fact that although implementation of quality management systems may be a strategic requirement in organisations, the oraganisational culture may adversely impact on the successful implementation thereof. The need for change in procedures as a result of the implementation will be highlighted as it is an absolute requirement for implementation.

CHAPTER 2: BACKGROUND AND INSIGHT INTO THE RESEARCH ENVIRONMENT

2.1 HULAMIN AS AN ORGANISATION

The Hulamin Group is an independent semi-fabricator of aluminium products, situated in South Africa with operations in Pietermaritzburg, Johannesburg and Cape Town. The company is structured around products and markets which include Sheet and Plate, Building and Painted Aluminium, Can Stock, Foil and Extruded Profiles. They produce a range of finished products including aluminium foil containers and fabricated building products.

The company uses a seamless approach between the market and manufacturing teams to develop, manufacture and supply a wide range of high quality aluminium products to selected global and domestic markets. The Extrusion Division is sited in all three plants, with Johannesburg and Cape Town only doing extrusions while Pietermaritzburg manufactures all products. The research will be focused on the Cape Town plant, which produces and supplies extruded aluminium profiles and semi-manufactured components in mill finish as well as in a range of anodized and powder coated finishes.

2.2 PRODUCT APPLICATION

An aluminium extrusion profile is the solution to almost all design problems by providing the following:

- Aluminium instead of steel, wood or plastic
- An extruded profile instead of casting, machining, moulding etc.

Extrusions are found in almost every industry and market applications. The following serve as examples where extrusions can be found, namely: homes, cars, offices, air planes, trucks, trains and boats; in airports, factories, machines and power stations. Profiles are produced in different shapes classified as angles, channels, rods, tubes, flat bars, square bars, hexagonal bars, rectangular hollows, square hollows, I-sections, tees and zeds. In this respect, are examples as depicted in Figure 2.1 and Figure 2.2.

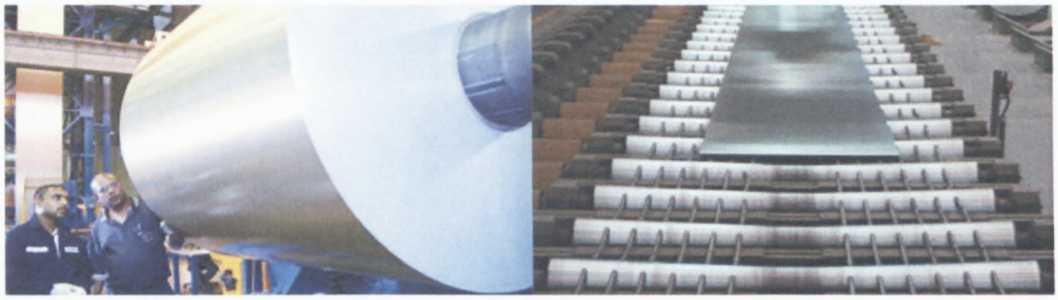

Figure 2.1: Rolled and Sheet aluminium during production (**Source:** Kayile, 2009:1)

Figure 2.2: Examples of some end uses for extruded aluminium (**Source:** Katz and Mackey 2009:2; Hiralal 2008:2).

The applications of aluminium are too numerous to list, which signifies the main benefit of aluminium, namely: its versatility. See Appendix A for a comprehensive overview of the South African Aluninium Industry.

2.3 QUALITY GUIDELINES: ALUMINIUM STANDARDS AND ASSOCIATIONS

In the past 10 years, Hulamin embarked on an initiative to implement the ISO 9001 to improve their product quality for competitiveness in the global market. The Pietermaritzburg plant is certified to SANS ISO 9001:2000, while the Johannesburg plant is in the process of re-certification. In June 2008, Cape Town was given the mandate to implement the system. The system allows for the management of quality throughout the production process starting with a comprehensive contract review, through to the shipment of product to customers.

Laboratory analysis which includes spectrographic analysis of all material produced, tensile testing of finished products, ultrasonic testing etc is done at the

Pietermaritzburg plant. Extruded profiles are produced to the tolerances indicated in the Hulamin Extrusions Data book. The manufacturing tolerances are those of BS EN 755:1997. Anodised products are produced to the requirements of SANS 999 and SANS 1407. Hulamin is a member of the Association of Architectural Aluminium Manufacturers of South Africa (AAMSA). It is a professional organisation uniquely committed to the disciplines and standards of quality which surround the manufacture and installation of Aluminium products, Interior building systems, Glass and Glazing, Building insulation and associated activities.

AAMSA provides a forum for the exchange of expertise and interaction between individuals and organisations to create a competitive advantage for the Architectural industry. Hulamin is also a member of The Aluminium Federation of South Africa (AFSA). AFSA is an aluminium association which offers its members a wide variety of services, the most notable of which are technical information and advice, education, training and skills upgrading.

2.4 CULTURE IN THE CAPE TOWN PLANT

Top management calculated an expected date for certification without prior assessment of the status of quality management in the plant against the requirements of the standard to ascertain gaps. A clear of understanding of top management on what needs to be changed in order to meet the requirements of the standard creates resistance is evident. Management are the very people needed to provide the required resources to implement the changes, however their perceptions are that it should be easy to adopt the system from the other plants. This inhibits the opportunity to implement the standard correctly.

The certification process is viewed by management as a simple matter of transferring what the other plants are doing onto the Cape Town plant. An issue pertaining to this assumption is that the machinery and equipment used does not function in the same way as in the other plants. This means that during each process, each operation has to be viewed individually in order to validate its ability to achieve the required results and facilitate improvement.

One of the biggest challenges in the organisation is that people claim to know what needs to be done to improve each facet of the business. Departments operate on an experience basis without approved written procedures. There is no assurance that each employee performs their duties in the same manner all the time, due to the lack of approved written procedures. There is no proof that they were adequately trained and assessed for competence. Throughout the production process there are assumptions that processes are being managed as required and inspections are performed to achieve the required results, but there is no adequate evidence of conformance. When problems arise, supervisors usually have ideas on how to solve them. The time taken to do the investigations for non conformances is usually unacceptable in facilitating feedback to the customer.

Lack of commitment to the quality system is evident from claims that incumbents have 'other more important things' to do. When investigations are eventually completed, feedback is usually insufficient as it still suggests that the cause could be from a number of issues as opposed to down streaming the possibilities to get to a root cause of the problem through a process of elimination. This opens loop holes where contributing factors to inefficiencies are not adequately addressed and non conformances reoccur. The approach to facilitate prevention is usually not proactive, which encourages bad habits and inhibits improvement opportunities.

2.5 THE WAY FORWARD

Since the introduction of the ISO 9001 standard, there has been a global recognition of the utility of management systems standards and approaches. This internationally recognized system to assess conformity has been designed to assure the quality, transparency and integrity of the conformity assessment process. Organisations need to make the necessary cultural shift to support and value assessment and improvement. This cannot be achieved without the investment needed to develop infrastructure, systems and people. It is an investment that few organisations may not afford but need to continuously improve their product or service quality.

The ability to acquire, interpret and synthesize information and knowledge has become a key differential in an increasingly competitive market place. In order to achieve the desired standards, companies need to facilitate development and more importantly, sustain a culture of assessment and continuous learning. This study will assess the changes required in order to facilitate successful implementation of the system and hence improve overall product quality. Successful implementation of the QMS depends on the attitude of employees at all levels and challenging the norm.

CHAPTER 3: QUALITY MANAGEMENT AND CULTURE: A LITERATURE REVIEW

3.1 INTRODUCING A QUALITY MANAGEMENT SYSTEM

Chapman (2008:**Online**), defines a Quality Management System (QMS) as, "...a set of coordinated activities to direct and control an organisation in order to continuously improve the effectiveness and efficiency of its performance". Total Quality Management is defined by Psychogios (2007:40-66), as "the mutual cooperation of everyone in the organisation and associated business processes to produce products and services which meet and, hopefully, exceed the need and expectation of customers". Customer expectations inevitably drive and define performance criteria and standards, resulting in QMS focusing on customer expectations.

According to Forgaciu and Rahau (2008:1-2), the assurance of quality of the delivered products and services has always represented the main goal of any organisation that wishes to be in the market. The authors state that the concept of quality is larger than in the past, referring also to management aspects. Thus, the quality of products and services does not represent only a goal, but a consequence of the quality of the whole managerial activities, workers, and even a quality of partnerships. According to Forgaciu and Rahau (2008:1-2), implementing a QMS is not that difficult as it seems, the key is planning and commitment. How complex or simple the QMS is, depends entirely on the organisation and what the objectives are.

Foster (2001:87), believes that to effectively use the ISO standard, one needs to plan ones processes, follow them, ensure their effectiveness, correct deficiencies and continually improve on them. The objective of ISO 9001:2000 is for organisations to demonstrate their ability to consistently provide products and services that meet customer and applicable regulatory requirements (Smithers, 2005:2). The author emphasizes that the key factors to this include, processes (their sequence and interaction), definition of criteria and methods to assure

control of processes, provision of resources, analysis of information and actions to implement and improve. According Smithers (2005:2), there are clear tangent plains between different QMS's as they focus on similar aspects requiring quality managers to become familiar with these philosophies, and apply them where appropriate in the organisation. According to Ramanauskienė and Ramanauskas (2006:65), a QMS is usually applied for the whole activity concerning the quality of product/ service. The system should include all stages of product life from the primary market need analysis to the total satisfaction of the customer.

Typical stages of the realisation of a QMS in line with the ISO 9000 series of standards are as follows:

Stage 1: Preparation work for the creation of the quality management system:

- Decision to create quality management system (the order of the head of the organisation).
- The preparation of the main program.
- The study of ISO standards.
- Formation of managerial and work groups for the introduction of ISO standards.
- The analysis of the present elements of a quality system.
- The formation of the program for quality system creation.
- Preparation of quality policy.
- Distribution of capacities and authorisations according to the functions of the quality system.

Stage 2: The preparation and implementation of the documents of the quality management system:

- Documentation structure and composition.
- Working out the schedule for document preparation.
- Document preparation and implementation.

Stage 3: The preparation of the QMS for certification:

- The assessment of the QMS (internal organisation audit with the help of consultants).
- Correcting activities and their realisation.
- The choice of a certification institution, documents preparation.

- Presentation of the order for a certification institution.
- Creation of certification conditions.

Thomas, Marosszeky, Karim, Davis and McGeorge (2002:4-5) citing Cameron and Barnett (2000), describe the development of quality management as being characterized by three distinct phases, namely:

- Error detection, starting in the 19th century and ending in about 1960;
- Error prevention, only lasting to the 1980s and
- Continuous creative quality, starting in the late1980s/early 1990s.

In the first era quality was controlled as close as possible to the source, reducing non-value adding activities and minimising costs arising from variance. It was inherently reactive, defensive and protective.

Thomas, Marosszeky, Karim, Davis and McGeorge (2002:4-5), state that learning and continuous improvement results in less rework. In the first era quality control was a specialist activity, and this was the era of statistical control. In this paradigm, quality management did not add value; it corrected mistakes and cost money resulting in waste. The second era, 'error prevention', emerged in the early 1980s in response to a perception among leading manufacturing companies in the US and Europe, that their costs were too high and that through error prevention-quality improvement, Japanese manufacturers had gained a competitive advantage.

The third era, 'continuous creative quality', led to a convergence of the business and the quality strategies of an enterprise. The focus moved to creating new, unexpected benefits for customers and the creation of brand loyalty. According to Thomas *et al.* the vision of quality broadened to encompass all aspects of the organisation, leading to the emergence of TQM. The authors view quality as the responsibility of everyone in the production line. The aim was zero defects and the goal was to satisfy customers rather than to fix problems. The authors find it interesting that lead contractors are only now entering the 'error prevention' era, 40 years behind lead manufacturers.

According to SRI Quality System Registrar (2007:2), most often organisations implement a QMS based on a recognised standard such as ISO 9001, because customers request it as a requirement to do business with them or have asked about the organisation's plan to implement it. The institution views benefits of implementing a QMS to go beyond retaining existing customers or qualifying for new contracts. It also provides discipline, improves processes and increases the productivity and effectiveness of company's operations. A consistent, reliable, well documented management system results in reduced scrap and waste, less human errors, and as a result, increased profitability and customer satisfaction.

SRI Quality System Registrar (2007:2), states that those that have undergone the process, often will point to the following benefits:

- QMS certification demonstrates a commitment to customers and stakeholders by top management.
- It increases customer satisfaction through improved responsiveness and product/service reliability.
- QMS certification forms a strong, recognised foundation for meeting regulatory requirements.
- It enhances the image of an organisation through proactive quality-focused leadership and international credentials.
- It reduces operating costs through error prevention, clear work instructions, consistent practices, and lower overall liability.
- QMS certification improves communication between employees, customers and suppliers.
- QMS certification identifies opportunities for improvement through best practices, process metrics and customer feedback.

3.2 THE CHALLENGES OF ORGANISATIONAL CULTURE

3.2.1 Defining organisational culture and its dimensions

According to Cheng and Liu (2007:9) citing Hofstede (2001) and Schein (2004), organisational culture is the collective programming of the mind that distinguishes the members of one organisation from another. Cheng and Liu (2007:9), define organisational culture as, "... a pattern of shared basic assumptions that was learned by the organisation as it solved its problems of external adoption and internal integration that has worked well enough to be considered valid". This then is to be taught to new members as the correct way to perceive, think and feel in relation to those problems.

Researchers often use different dimensions to describe organisational culture. For instance, Caldwell, Chatman and O'Reilly (1991) cited by Cheng and Liu (2007:9), identify seven dimensions to develop an Organisational Culture Profile (OCP) namely, innovative, stable, respecting people, outcome oriented, detail oriented, team oriented and aggressive. According to Adalsteinsoon and Gudlaugsson (2007:6-7) citing Trompenaars and Woolliams (2003), an instrument termed CCAP (Corporate Culture Assessment Profile) can be used to analyse organisational culture. The CCAP model is related to the method of Hampden-Turner and Trompenaars, to assess personal and national culture, consisting of seven bi-polar cultural dimensions.

The first dimension, termed 'universalism vs. particularism', concern rules and relationships or the question whether general rules and obligations take precedence over particular relationships such as obligations towards friends or family. The second dimension, 'individualism vs. communitarianism', concern whether individuals place more emphasis on their own individual needs or on the interests of the general society. In individualistic cultures, the individual takes the responsibility for the course of his or her own life. The third dimension relates to the 'specificity or diffuseness of the society'. In specific-oriented cultures, the society is divided into defined subgroups or sub-cultures.

The fourth dimension considers whether 'status is achieved or ascribed'. Here the tension lies in whether a person is esteemed based on achievement, or whether family ties and origins matter more. The fifth dimension concerns the focus of control, 'inner vs. outer direction', or orientation towards nature and the environment. While inner directed cultures believe that nothing happens by fate or luck but by self determination, outer-directed cultures believe that everything has a purpose, the individual must rely on external factors, fate and luck for success.

The sixth dimension relates to time orientation, or 'sequential vs. synchronous time'. At one end of the dimension time is linear, strictly divided into periods like weeks, months and years while at the other end time is recurrent and cyclical. The seventh and final dimension concerns emotion or 'affective vs. neutral cultures'. It addresses the question of how easily and readily people express emotions. Adalsteinsoon and Gudlaugsson (2007:6-7), state that it is possible for advantages of a culture, to become disadvantages if taken too far. Dilemmas deriving from the tension between the culture types often require some type of culture change or reconciliation.

Adalsteinsoon and Gudlaugsson (2007:7) citing Cooke and Lafferty (1989), describe the Organisational Culture Inventory (OCI) method as an instrument aimed at assessing organisational culture based on behaviours that individuals in organisations believe are required and expected of them, and will be rewarded and reinforced. It also provides a picture of the current organisational culture and enables organisational members to determine the ideal culture for the organisation and how to change the current culture towards the ideal culture.

According to Du Toit and Roodt (2008:80), dimensions of culture are subdivided into two categories namely, those that relate to the external environment and those that relate to the internal environment. Dimensions relating to the external environment are strategy, mission, goals and objectives; shareholders, customers, competitors and community and the means to reach goals. Dimensions relating to the internal environment are employees in the organisation, interpersonal relations, management processes and management orientation. Figure 3.1 below reflects the internal and external dimensions of culture.

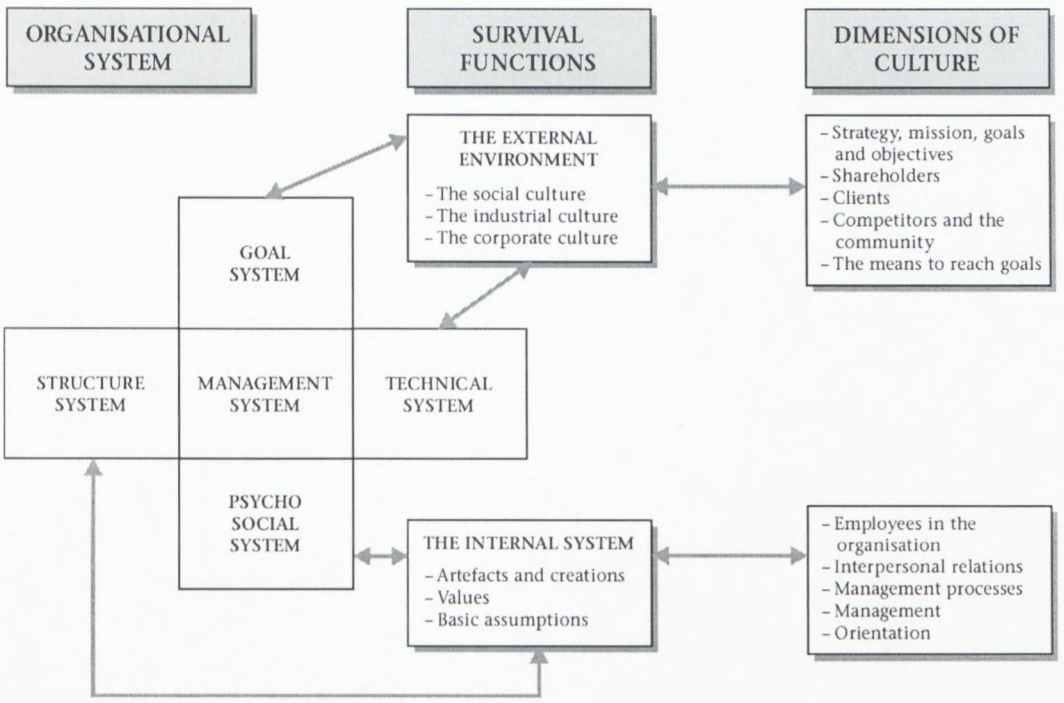

Figure 3.1: A Model of Organisational Culture (**Source:** Du Toit and Roodt, 2008: 80).

According to Siakas and Georgiadou (2002:59-70), the basic assertion in cross-cultural studies is that national culture, expressed in terms of values and beliefs, has a direct impact on organisational culture and individual behaviour imposing guidelines and expectations for the members of the organisation. Culture and functioning of organisations is also 'directly' affected by the economical, political and legal environment imposed by governmental rules, the technical environment such as communication networks, and 'indirectly' by the socio-cultural environment in which the organisation exists.

According to Zu, Fredendall and Robbins (2006:13-17), in the context of quality management, the values and beliefs underlying an organisation's culture are able to shape its philosophy and policies of managing business. This will in turn influence the development of the organisation's quality management practices. It has been argued that for an organisation to realise the value of implementing quality practices, it must have a culture that is capable of fully supporting the implementation. Tongwe and Rodriguez (2008:6), address organisational culture through questioning company values, metrics tracked, management focus and whether individual and company success is tied to client success. The authors

believe that overcoming such barriers is critical to realise the envisaged 'desire to know' culture that would support the commitment to becoming a learning organisation. According to Jantii, (2005:6), as espoused by change management theorists, the involvement of people in planning and implementing desired change is essential to success. Senior leadership's constant role modeling of these principles and the creation of a supportive environment to live them is necessary for the organisation to reach its true potential.

According to Willcoxson and Millett (2000:1), although some writers argue that organisational cultures are unitary and integrated. Others argue for the existence of pluralism or differentiated sub-cultures in the same organisation. Others adopt a fragmented or anarchist perspective and claim that 'consensus fails to coalesce on an organization wide or sub-cultural basis, except in transient, issue-specific ways'. The author states that with the anthropological or scientific rationalist paradigm, there is no one demonstrably correct perspective. The perspective adopted will influence the change strategies used and some organisations are more likely to have a single unitarist culture while others are more likely to be pluralistic or anarchistic in nature.

3.2.2 People management as a component of organisational culture

According to Hegedus (2007:1-2), a key component in business process management is that of the people. Achieving a culture of process based management is the ultimate transformation and the sustaining legacy we strive for. To broaden our perspectives, the author classifies a view of processes according to traditional thinking and contemporary thinking. Hegedus (2007:1-2), states in traditional thinking, the mapping and modeling of processes are the predominant starting point for most process specialists and often as far as they take their endeavours. Process documentation is destined to become 'shelf ware' for most of the business and for operations staff it is often out of date or perceived as not being the best way to do things to satisfy the customer or the business.

Hegedus (2007:1-2), defines a 'process' in contemporary view as, "...encompassing the broad spectrum of business components that enable the efficient and effective operations of business processes". These are components such as:

- Organisational Performance Models.
- Enterprise architectures.
- Process Taxonomies or Domain Architectures.
- Value Chains and Process Maps.
- Procedures and Work Instructions.
- Human and Technology enablement.
- Measures of Performance – lead and lag, people, process, customer.
- Maturity Models, Methods and Tools.
- Process Improvement Methods.

According to Sheng, Pearson and Crosby (2004:3), the shared perceptions and beliefs that make up an organisation's culture are fostered and cultivated by communications and interactions among people inside and outside the organisation. These perceptions and beliefs then effect and can be influenced by people's behaviors on issues like how to solve problems, how to conduct a job and how to communicate (Bates, Amundson, Schroeder and Morris, 1995 cited by Sheng *et al.,* 2004:3). The authors view these issues to affect an individual's job performance and satisfaction, and then affect a firm's performance.

According to Sheng, *et al.,* citing Yeung, Brockbank and Ulrich (1991), it has been shown that organisational culture (and various subcultures within the organisation) can have a positive effect on competitive advantage, increased productivity and a firm's performance. On an individual level, organisational culture could affect an employee's participation and involvement. According to Balthazard (2004:4), these distinct but interrelated sets of behavioral norms and expectations describe the thinking and behavioral styles that might be implicitly or explicitly required for people to 'fit in' and meet expectations in an organisation.

The author states that organisations adapt to their external environments by designing responsive structures and systems, adopting relevant technologies and harvesting appropriate skills and qualities. Although constrained by its environment, an organisation makes a number of 'choices' which, collectively, eventually define its culture and define the success or failure of its initiatives. According to Konečná (2006:59), cultural shock is perceived as a feeling of disorientation connected with the fact that people are exposed to the necessity to communicate and cooperate with someone who perceives the situation differently and does things in a different way.

Konečná (2006:59), states that at the same time each participating party is convinced that the way they do things is the only correct one, feel frustrated and suffer from the loss of position. If the cultural differences are not managed, the situation results in mutual disbelief, misunderstandings, disillusion, decrease of morals and productivity and an increase of fluctuation and leaving of key workers. This disillusion may lead to resistance, unwillingness to create synergies and decrease in efficiency of the organisation.

3.3 THE NEED FOR CHANGE MANAGEMENT

3.3.1 Defining change management

According to McGregor (2004:1-2), change management refers to organisation-wide change, which is change that affects all systems, structures and processes as well as organisational culture. Although the impact of change may differ, recommended processes tend to share common themes. McGregor (2004:1-2), summarised the steps in planning and implementing successful change projects as consisting of defining the current state, defining the future state, determining key sponsors and implementers, adjusting environment feedback, rewards to support desired change, and reviewing progress against metrics. In order to remain competitive in global markets, firms world-wide are focusing their attention on issues of quality.

According to Lord (1996:4), even if the change agent is a 'powerful leader', the success of the attempted change of culture is not guaranteed due to the fact that any organisational change involves individuals and groups who may be in conflict. Lord (1996:4) citing Fischer and Dirsmith (1995), warn that, "...because culture is produced by social interaction, it cannot unilaterally be created and manipulated by management". Change is defined as, "the outcome of the complex exchanges between individuals pursuing a diversity of goals", Georgiou (1973) cited by Lord (1996:4).

According to Böhm (2009:1), changing the very way in which people do their daily work and process information will have a huge impact on any business. When implementing a new system that will have an effect on all parts of the business, Organisational Change Management (OCM) is needed. OCM includes processes and tools for managing the people side of the change at an organisational level. These tools are based on a structured approach that can be used to effectively transition groups or organisations through change. Böhm (2009:1), views it as important to remember that OCM is a formal, structured process that must be planned and executed. The author states that it can save the business a lot of trouble and unnecessary expenses if taken seriously.

According to Garside (1998:2) citing Beckhard and Harris (1987), change management is not a neat sequential process. Garside (1998:2), states that organisational culture change is typically modeled as a three part process that takes a 'flawed organisation', moves it through arduous 'transitional' stage and deposits it at the end in the enriched 'desired state'. Garside (1998:2), views resistance to change by organisational stake holders as a strong restraining force, while low tolerance to change due to fear of being unable to learn new skills or work behaviour are some of the primary resistors.

3.3.2 Change management process

According to Motlhatlhadi (2005:8), managerial activity is focused at breaking through into new performance levels by creation of change meaning 'Breakthrough' or alternatively prevention of change meaning 'Control'. Prevention of change implies the existence of an accepted standard and the change that organisations try to prevent is a departure in the wrong direction from their accepted standard. Managers in many organisations are preoccupied with crisis after crisis 'fire-fighting' that they have no time for implementing strategies. Breakthrough is therefore the creation of good change, whereas control is prevention of bad changes and both are critical for the survival of an organisation.

According to Ogbonna and Harris (2002:1), one of the difficulties in managing culture is the complexity thereof, which can lead to organisations attempting 'quick fixes' that are superficial. Ogbonna and Harris (2002:1) citing Dunphy (2000:3), state that the sustainable organisation demands a radical change in thinking about culture, transforming the organisation from being a part of the problem to being a part of the solution. If people's behaviour has changed, it does not mean that organisational culture has changed.

According to Cameron and Quinn (1999:7), without change of the culture in an organisation, there is little hope of enduring improvement in organisational performance. A primary reason for the failure of many efforts to improve organisational effectiveness is that, whereas the tools and techniques may be present and the change strategy implemented with vigor, failure occurs because the fundamental culture of the organisation remains the same. Cameron and Quinn (1999:8), views this dependence of organisational improvement on culture change as due to the fact that when the values, orientations, definitions and goals stay constant even when procedures and strategies are altered, the organisation returns quickly to the status quo.

According to Hodgson and Zaaiman (2003:46) citing Mintzberg, Ahlstrand and Lampel (1998), in major organisational change, several methods or projects will form elements of the overall change work and will probably occur at the same time. They must be planned, co-ordinated and controlled to maintain order and achieve a seamless transition with minimal disruption to daily operations and profitability and must occur as quickly as possible if the outcome is to be relevant to the business aims and environment, (Waterhouse, 1996 cited by Hodgson and Zaaiman, 2003:46). A lack of coordination across work streams, disciplines and departments could lead to disruption, errors, crisis management and a poorly implemented change effort, (Duck, 1993 cited by Hodgson and Zaaiman, 2003:46). With all this to balance, the statement "this is a confusing body of work", regarding the change approach as appropriate.

3.3.3 The influence of employee behaviour in change management

According to Lombard and Zaaiman (2004:7) citing Folger and Skarlicki (1999), resistance has been defined as, "...employee behaviour that seeks to challenge, disrupt or prevent change from taking place". It is a response to feeling threatened that results in anxiety. Resistance to change is closely associated with 'fear of loss' and 'fear of the new', (Lombard and Zaaiman 2004:7) citing (Coker 2000); (Mabin 2001); (Tichy 1997); (Seely 2000) and (Pheng 1999). Resistance to change results in people that are complacent and do not function at their full potential (Lefton and Buzzota, 1980) cited by (Lombard and Zaaiman 2004:7). It can therefore be argued that first-line managers need to create and maintain an environment, where people are empowered and accountable.

Such an environment is characterised by team members that choose growth above fear. The environment that the first-line managers should create is one where:

- Team members can learn from their mistakes.
- Team members share their suggestions and opinions although it might not be accepted.
- Team members will confront the brutal facts irrespective if it means being unpopular with team members.

- Accepting that being emotionally uncomfortable is an opportunity to move outside of the comfort zone into the learning zone.

According to Stoyko (2009:12), a great deal of information and knowledge management technology relies on clarity of meaning. Meta-tagging protocols for labeling documented information, for example can accommodate many different synonyms and slang terms to help people find what they are looking for. Unfortunately, these systems breakdown when evasive language and 'spin doctoring' becomes part of the culture. Stoyko (2009:2), defines evasive language as, "...the use of vague buzzwords, loaded terms, clichés and catch-phrases to obscure meaning. This typically happens when people are trying to hide gaps in knowledge or make themselves look smart.

Stoyko (2009:2), defines 'spin doctoring' as, "...the deliberate manipulation of language in order to unduly and surreptitiously influence others or distract attention. Stoyko (2009:2) citing Peter Morville's (2005), believes that for knowledge managers, these tendencies undermine 'findability'. The author defines 'findability' as, "...the ability to discover and access relevant information as required, an essential characteristic of any document system designed to preserve or retrieve memory. Moreover, evasive language and spin-doctoring undermine the ability to make productive use of information once found because it contains vague and slippery advice.

According to Stoyko (2009:12), the manager's job is to promote plain language, such as precise terminology, clarifying definitions and active verbs. An important countervail is for the manager to call out suspected evasion with probative questions and encourage others to do so. These measures only have widespread impact if they become a common habit and shape the way language is used in the workplace.

Napolitano, Ordoñez, Senesi, Palau, and Pérez San Martín (2005:4), mention that the effective implementation of ISO 9001:2000 promotes indispensable 'culture building' among organisation members resulting from adding up the behaviors of all members. This shift in 'how things are done' implies adjusting structure, which is considered the system of authority (organisational chart). The author states that

the management of communication, influences information and control of change. Redesign occurs by causing the revision of all business processes considered key processes for the customer and 'in partnership' with key suppliers. According to Napolitano, *et al.* (2005:4), customer needs and the opinions of organisation members are heeded as feedback for continuous improvement allowing permanent adaptation and sustained learning. The authors state that documented processes act as the company's 'active memory' and are available for organisation members resulting in an efficient management system for organisational knowledge.

According to Fleury (2009:6), organisational culture and organisational competences are not as commonplace as those concerning the inter-cultural competences of individuals. The author incorporates the notion of culture with the development of competence by individuals. According to Fleury (2006:9) citing (Zarifian 2001), in order to develop their competence, people need to acknowledge the company's shared values. Values cannot be imposed top-down, but should emerge from the group itself, they may then at a later stage become formalised.

3.3.4 The influence of professionalism on an organisation's culture

Although Zarifian (2001) cited by Fleury (2006:9), recognizes that there are significant differences in terms of perceptions between the different levels of the company, given social discrepancies and different interests. The author believes that in a strictly professional environment culture may be shared, thus establishing a common language about what would be a competent practice in a specific professional scenario. According to Fey and Denison (2000:7) citing Denison and Mishra (1995), cultural traits of effective organisations can be viewed in four aspects namely, involvement, consistency, adaptability and mission, which are elaborated upon below:

- **Involvement**: Effective organisations empower their people, build their organisations around teams, and develop human capability at all levels. Executives, managers and employees are committed to their work and feel that they own a piece of the organisation. People at all levels feel that they have at

least some input into decisions that will affect their work and that their work is directly connected to the goals of the organisation.

- **Consistency:** Organisations also tend to be effective because they have 'strong' cultures that are highly consistent, well coordinated and well integrated. Behavior is rooted in a set of core values with leaders and followers who are able to reach agreements even when there are diverse points of view. This type of consistency is a powerful source of stability and internal integration that results from a common mindset and a high degree of conformity.
- **Adaptability:** Ironically, well integrated organisations are often the most difficult ones to change. Internal integration and external adaptation can often be at odds. Adaptable organisations are driven by their customers, take risks, learn from their mistakes and have the capability and experience at creating change. They are continuously changing the system so that they are improving the organisations' collective abilities to provide value for their customers.
- **Mission:** Successful organisations have a clear sense of purpose and direction that define organisational goals and strategic objectives and expresses a vision of how the organisation will look in the future. When an organisation's underlying mission changes, changes also occur in other aspects of the organisation's culture.

According to Koopman and Cook (2006:5), high performance lies with understanding, educating and engaging the culture within an organisation, it is what an engaged culture is all about. It involves having an execution plan where people follow through and act on the commitments that were made, creating an environment of true accountability. According to the authors, benefits can be derived through effectiveness from building a culture of employee engagement in the organisation. A systematic approach addresses organisational attributes, beliefs, values and expectations of all.

Koopman and Cook (2006:5), state that organisations are viewed as systems with three distinct subcategories:

- **The Why:** Why the organisation exists (its purpose and mission).
- **The What:** What the organisation does to accomplish programs and its vision.
- **The How:** How individuals, teams, divisions, departments and other sub-groups interact and associate attitudes, habits and behaviors (organisational culture).

Most change efforts have focused on the 'Why' and the 'What', not on the 'How' of organisational culture. In order to achieve highest returns on assets, associates at all levels of the organisation warrant careful management and thoughtful leadership.

Choo, Furness, Paquette and van den Berg (2006:492), define information management as, "...the application of management principles to the acquisition, organisation, control, dissemination and use of information to fulfill requirements or expectations". It is ultimately concerned with the value, quality and use of information to improve organisational performance. Information culture is reflected in the organisation's values, norms, and practices with regard to the management and use of information.

Choo *et al.* (2006:495), state that the information that is eventually used is a very small subset of the total information that is encountered. The outcome of information use is a change in the individual's state of knowledge or capacity to act. Thus, information use involves the selection and processing of information in order to answer a question, solve a problem, make a decision, negotiate a position, or make sense of a situation.

3.3.5 Employee involvement in change management

According to Davidson (2003:57), when a problem or opportunity which requires change arises, employees have much to contribute in terms of defining whether change really is required and, if so, what form it should take. The need to draw on staff knowledge can be accomplished by consultation and communication. The author believes that the second main reason to involve staff is to gain their

commitment. The author states that the aim of this is to overcome potential resistance to and develop a positive attitude towards, change. Unless staff have a positive attitude, success is unlikely to be achieved (Burnes and James, 1994 cited by Davidson, 2003:57). Intrinsic motivators attempt to persuade employees of the inherent worth of the new culture by pointing out the negative consequences of not changing and the advantages of adopting the new beliefs, values and assumptions.

According to Martins and Coetzee (2007:21) citing (Martin 2005 and McMurray 2003), employee preferences as to how they wish to be managed and how they experience the dominant leadership style also influences the way culture develops. In this regard, although organisational culture appears to have common properties, researchers emphasise evidence of the existence of dominant cultures and a number of subcultures in most large organisations. Research by Ogbonna and Harris (2002:**Online**), indicate that employees at different levels in an organisational hierarchy have different views of organisational culture.

Martins and Coetzee (2007:20), state that variables such as departmental groupings, geographical distribution, occupational categories, race, gender and age groups including the influence and style of the manager all play a role in the formation of sub-cultures. According to Parish, Cadwallader and Busch (2007:34) citing Herscovitch and Meyer (2002), it is important for organisations to consider objects of commitment in addition to the organisation itself, such as supervisors or change initiatives.

Parish *et al.* (2007:34) citing Noble and Mokwa (1999), define organisational commitment as, "...the extent to which a person identifies with and works toward organisation-related goals and values". Herscovitch and Meyer (2002) cited by Parish *et al.* (2007:34), define commitment to change as "...a force (mind-set) that binds an individual to a course of action deemed necessary for the successful implementation of a change initiative".

According to Parish *et al.* (2007:36) citing Pfeffer, (1994), during planned change, the quality of employment relationships plays an important role in promoting employee acceptance and involvement. An employee's perception that a change initiative is consistent with an organisation's vision enables them to commit to the change. Research has shown that employees who believe that their managers are supportive tend to be more committed to their organisations. The author states that job motivation also influences attitudes and it has implications for employee commitment to organisational change. Furthermore, if employees are motivated, there is a greater likelihood of their commitment to the organisation and organisational change.

3.3.6 The influence of organisational culture on performance

According to Rose, Kumar, Abdullah and Ling (2008:47-48) citing (Cameron and Quinn 1999; Deal and Kennedy 1982; Denison 1990), a high degree of organisational performance is related to an organisation with a strong culture, well integrated and effective set of values, beliefs and behaviors. However, many researchers noted that culture would remain linked with superior performance only if the culture is able to adapt to changes in environmental conditions. Furthermore, the culture must not only be extensively shared but it must also have unique qualities, which cannot be imitated (Lewis, 1998; Lim, 1995; Ouchi, 1981; Pascale and Athos, 1981 cited by Rose *et al.* 2008:47-48).

According to Mihaela, Stefanita and Alina (2007:94-95), in the view of creating performance, all the elements of the organisation that add value and meaning to achieved results have to be taken into consideration. These can be classified as follows:

- **Economic elements:** Profitableness and competitiveness.
- **Juridical elements:** The legal conformity and solvency.
- **Organisational elements:** Competency, coherency and efficiency.
- **Social elements:** Synergy, involvement, satisfying the staff, professional development, quality of work and inter-human relationship.

Mihaela *et al.* (2007:98), state that in the view of emphasising the relationship between the organisational culture and efficiency in business on achieving the stipulated results, the role of human factor has to be taken into consideration, meaning:

- The organisational culture, by specific values, directly influences the work environment and implicitly the level of satisfying the employees;
- The organisational culture performs a pressure over each employee's behaviour, which is directed towards accomplishing all tasks and responsibilities;
- The individual performances unite synergically and compete on growing the company's efficiency.

According to Rose *et al.* (2008:47-48) citing Calori and Sarnin, 1991; Gordon and DiTomaso, 1992: Kotter & Heskett (1992), several empirical studies have supported the positive link between culture and performance. Cultural strength is significantly correlated with short term financial performance (Denison and Mishra, 1995 cited by Rose *et al.* 2008:47-48). The authors state that organisations that focus clearly on their cultures are more successful. This is because focused cultures provide better financial returns including higher Return On Investment (ROI), higher Return On Assets (ROA) and higher Return On Equity (ROE)

According to Grigoruta and Corodeanu (2005:361), when there is a weak or weakly supported organisational culture in an organisation, a transfer (change process) from the present culture to an improved one is required. According to the author, it is necessary to redefine the set of values common to all organisation members that help them understand the purpose proposed by managers, how to accomplish it and what they think is important for the future. According to Grigoruta and Corodeanu (2005:361), it is extremely difficult to influence people to change attitudes and concepts learned over a long time, and these attempts often fail. All managers can do is determine organisational members to change their behaviour in order to reduce the disfunctional elements in a culture and introduce functional ones.

According to Guy and Beaman (2004:16), a useful distinction can be made between the action focused change management (what people do) and the attitudinal or relationship side (how they feel about it). Any action plan developed for effecting change is more likely to succeed if it is accepted and positively endorsed by the people carrying it out. Developing a good action plan and communicating it clearly is vital, but strong employee relations and positive attitudes are also required for successful change. Guy and Beaman (2004:18), state that some challenges inherent in the structure of the organisation cannot simply be avoided through better planning or communication. Many changes have asymmetrical effects with respect to costs and benefits.

According to Schmidt (2006:1), change is made more difficult if organisations do not have the right skills to deal with it. The author states that there needs to be a fine balance between the level of change and employee skills in coping with the change in order for it to be successful. An imbalance between these competing forces can lead to:

- Not enough skills + Change = Stress.
- Not enough skills + No change = Apathy.
- Right skills + No change = Boredom.

However, when organisations get the balance right the result can be an unlimited opportunity to learn and grow. The kind of change organisations should be aiming for all the time is 'Right skills + Change = Growth', (Schmidt, 2006:1).

According to Buttles -Valdes (2008:6), organiations need to address challenges of skills shortage by closing the knowledge and skills gap. The author views work force issues in the following manner:

- **Retention:** Migration to other companies inside the country and migration to other countries.
- **Knowledge and skills gap:** Invest in knowledge and skill profiles and assess current capability invest in training and development activities.
- **Shortage of workers**: Can place undue pressure on existing workforce, more work and longer hours and reduces productivity and increases defects and reduces morale and organisational loyalty.

- **Place a strain on Human Resources:** Hiring managers and/or recruiters, competition for experienced/skilled managers and intense competition for skilled and knowledgeable workforce.

According to Van Tonder (2006:1), major change initiatives are more frequently deemed unsuccessful and approximately 65% to 75% fail. The latter includes among other re-organisations, downsizings, mergers and acquisitions and culture change. It is equally widely acknowledged that the cost of institutional transformation or organisational change regardless of how it is conceptualised, is exceedingly high and while the financial consequences of unsuccessful and poorly planned and executed change initiatives are difficult to calculate but are commonly accepted as being substantial. Even in those rare instances where change initiatives are likely to be considered more successful, there will still be undesirable side effects or unintended consequences and consequently an inevitable downside to the change.

3.4 FACILITATING THE IMPLEMENTATION OF A QMS

3.4.1 QMS implementation strategy

According to Baroniene (2005:15-21), it is worth mentioning that after the implementation of management systems, organisations become more oriented to targeted criteria, react more operatively to the changing internal and external conditions and become more open to innovation. Successful implementation of innovative quality management methods provides the opportunity to better adapt to changing conditions and to better adapt to different innovations.

Research has shown that the implementation of management systems (based on ISO 9000 family standards) impact not only on the specifics of workers intercommunication, but also on the thinking and ways of getting the job done (Schenkel, 2004 cited by Baroniene, 2005:15-21). According to Cochran (2008:**Online**), leadership by top management is a primary theme of ISO 9001:2000. Section 5 of the standard, 'Management Responsibility', is notable for the first three words of each of its subsections: 'top management shall'. This

places the responsibility for carrying out the requirements squarely on the shoulders of top management. According to Lisai (2007:68), there are no right answers on how to implement a QMS in an organisation. It depends primarily on several factors such as the vision, attitude and commitment among top managers and employees, and the introduction of continuous education for enhancing fundamental skills and knowledge on quality improvement within the organisation. The process mapping step is a critical phase. The key is to find and then implement the new concept as well as its effects in terms of both productivity and physical and mental burden on the employees.

3.4.2 Knowledge sharing during QMS implementation

According to Gray and Dunsten (2005:596-595) citing Nonaka and Takeuchi's (1995), knowledge conversion is a "...social process between individuals and not confined within an individual". The process is known as the SECI process (Socialization-Externalization-Combination-Internalization), which was refined by Byosiere and Luethge (2004) can be demonstrated by a model of knowledge creation and conversion. It is comprised by four modes of knowledge conversion commencing with socialization where individuals share experiences and mental models to refine knowledge.

According to Gray and Dunsten (2005:597), tacit knowledge is converted into explicit knowledge through a process referred to as externalization. This translation process allows 'the individually held tacit knowledge concepts to be crystallised and shared with other members, creating new knowledge' (Byosiere and Luethge 2004 cited by Gray and Dunsten, 2005:595-596). The combination or knowledge sophistication mode where knowledge is ulated, shared, and expounded (McIntyre, Gauvin and Waruszynski 2003 artic cited by Gray and Dunsten, 2005:597), involves explicit knowledge being reconfigured into more complex explicit knowledge.

According to Gray and Dunsten (2005:597) citing Byosiere and Luethge (2004), internalisation refers to the mode where explicit knowledge becomes internalised through knowledge interpretation and is converted into tacit knowledge. The creation and transfer of knowledge in organisations depends on an environment

that facilitates communication and experimentation (Gray and Dunsten 2005:597 citing Davenport and Prusak 1997) as graphically depicted in Figure 3.2 below.

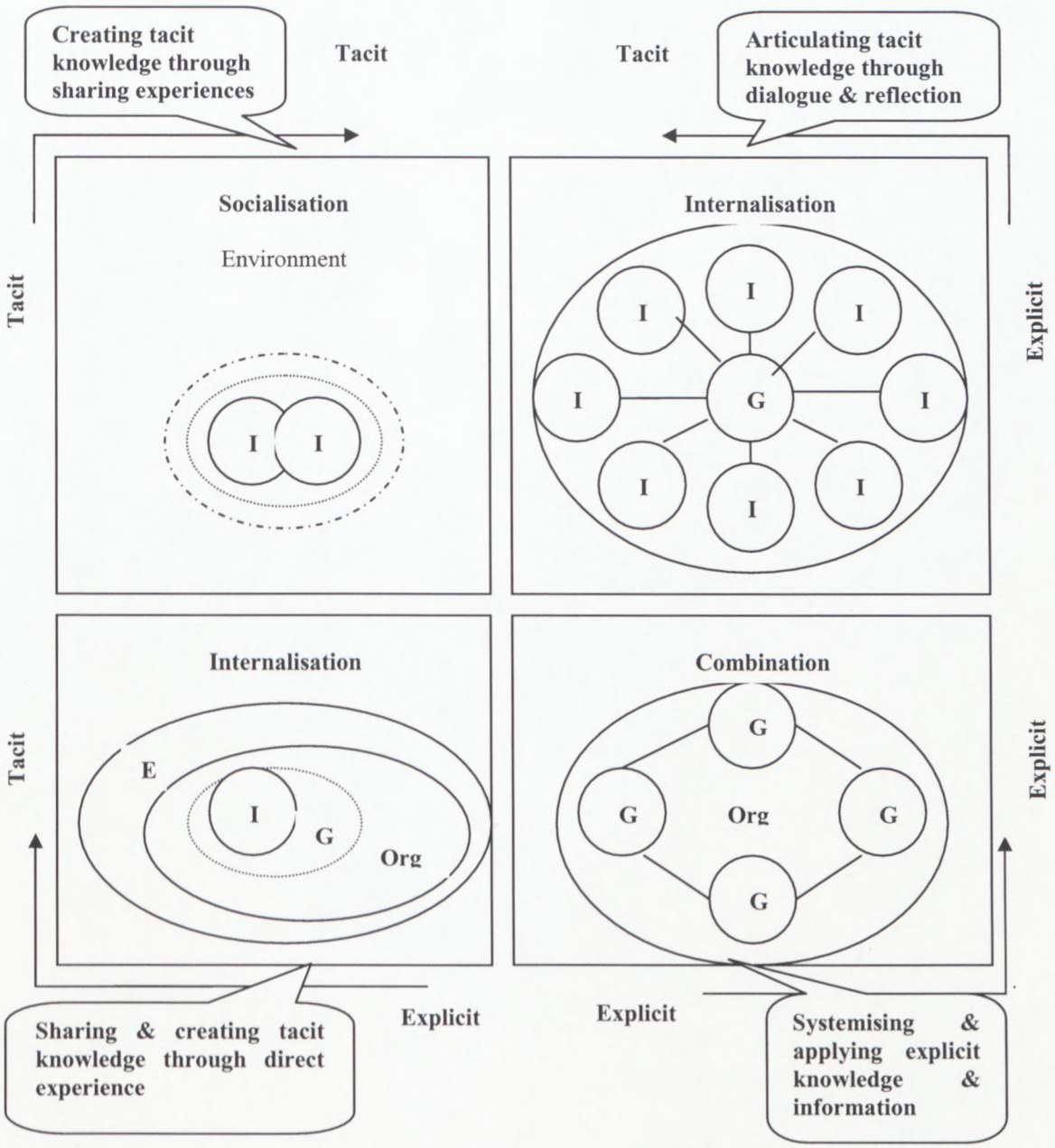

Figure 3.2: The creation and transfer of knowledge. (**Source:** Gray and Dunsten 2005:597citing Davenport & Prusak 1997).

According to Akamavi and Kimble (2005:5) citing (Rotter 1980:1), trust is defined as "...an expectancy held by an individual or group that the word, promise, verbal, or written statement of another individual or group can be relied on". In addition, trust is the expectation that the other party will perform a particular action important to the trustier, irrespective of the ability of the trustier

to monitor or control the actions of the other party (Mayer, Davis & Schoorman, 1995 cited by Akamavi & Kimble, 2005:5). The authors argue that if the recipient of knowledge is not convinced that the source is competent and trustworthy, it is unlikely that knowledge from that particular individual will be accepted. In addition, if on the other hand the owner of the knowledge is not confident or does not trust the seeker of the knowledge to reciprocate in the near future, they may choose to hoard their valuable tacit knowledge.

3.4.3 The role of change agents in implementing a management system

According to Andrews, Cameron and Harris (2008:301) citing Caldwell (2003), a key inhibitor to the successful implementation of change is the complex interaction that takes place between different change agents within an organisation. The author states that it is no longer common for a single 'hero leader' or 'organisational development consultant' to be charged with implementing a linear change process. Contemporary reality is that four distinct types of change agents may be involved in any particular change process, namely, senior leaders, middle managers, external consultants, and teams; each having different experiences and perspectives.

Andrews *et al.* (2008:301) citing (Caldwell 2003), state that differing experiences of middle and senior managers and the complexity of their interactions could be a problematic factor in implementing organisational change. They have little time for reflection on how theory might help them solve problems. Jacobs (2006:15), describes the differences between coaching as a manager and managing as a coach, the former being a hands-on approach and the latter being a hands-off approach. The more control the coachee has regarding the control, performance and motivation aspects of the coaching process, the further the coaching approach moves towards a hands-off approach from the perspective of the coach.

Research has highlighted many reasons for coaches not operating as hands-off coaches. Some of the reasons are listed below:

- A company culture with a strong tendency towards traditional hierarchical command, which is ill-suited to hands-off coaching.
- A company with a high staff turnover or a strong reliance to temporary staff.
- Managers are often held accountable for immediate results and faced with penalties for failure. For such managers, it is difficult to let go of tasks and trust the learner.

According to Mosia and Veldsman (2004:7) citing Koopman (1999), the inadequate linkage of strategy formulation to implementation could lead to poor execution and results. The answer to poor linkage could be found in that leadership role which aligns and integrates all activities of teams in an organisation (Margerison, 2001 cited by Mosia and Veldsman, 2004:7). Leaders playing this role should have the skill to link people and activities for the successful implementation of adopted strategies.

According to McGrath (2003:74), although power is exercised with specific aims and objectives in mind, the outcomes are unpredictable and may be unintentional. This is due to the network force relations in which each individual is involved. The author states that a specific change intervention may be achieved when the different interests involved in conflicting regimes are temporarily established to create some space for movement. A point can be reached where a dominant discourse emerges around a change intervention, and it becomes the accepted basis for organising or a way of arguing and acting that is not effectively undermined.

McGrath (2003:76), describes a process to accomplish such stability as follows:

- **Problemitisation:** Defining the problem in terms of the proposed solution.
- **Interestment:** Arousing interest in the problem.
- **Enrolment:** Consolidating alliances and negotiated solution.
- **Mobilising allies:** Representatives for implementation.

3.4.4 The process of implementing a management system

According to Zolghadar (2004:35), within the ISO norm, there is a process model described combining measurement, analysis, improvement and the responsibility of the leadership in a control cycle. This model is graphically depicted in Figure 3.3.

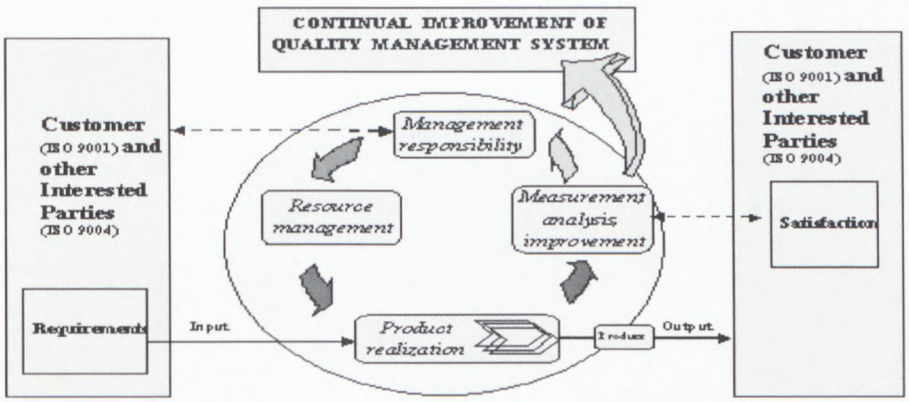

Figure 3.3: Process Model (**Source**: Zolghadar, 2004:35).

Zolghadar (2004:35), states that with regard to the measurability and assessment of processes, the norm calls for the determination of criteria and methods in order to be able to conduct and direct the processes. The company in turn is compelled to measure, monitor and analyse the processes. Furthermore, the company has to make arrangements to achieve the planned goals as well as continuous improvement of processes.

According to Hegedus (2007:3), organisations should not think of business processes in isolation of any of the other components that make up their dynamic system. They should be thinking of a business model that illustrates how processes inter-relate with the all business components including strategy, people, processes, technology and other components that constitute a system that they comfortably refer to as an organisation/company/business. Hegedus (2007:3), believes that organisations should begin to view their organisational systems as part of a larger system that both feeds into and feeds from it. This dynamic model is the basis of systems thinking and provides the holistic basis from which true understanding of organisational performance is derived.

Covey (1997) cited by Hegedus (2007:3), has one such model of Organisational Effectiveness as shown in Figure 3.4 below.

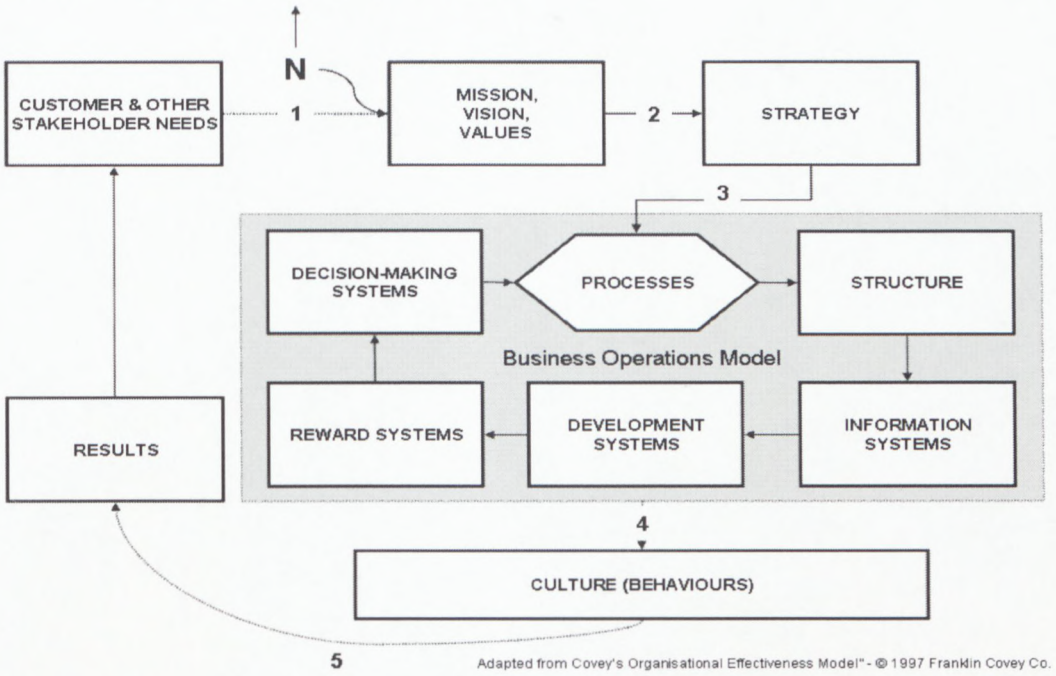

Figure 3.4: Organisational effectiveness model (**Source:** Hegedus, 2007:3 citing Covey 1997).

Hegenus (2007:3), describes the model in terms of the following aspects:

- The model can be used for organisational design and re-design.
- Processes enable strategies to be fulfilled.
- Processes precede structure in a (re)design effort.
- Culture and business results are outcomes of the business operations model.
- Technology enables process and is influenced by structure.
- The human performance components (structure, development systems, reward systems and decision-making systems) are a significant part of the business operations model.

According to Henrichs and Aden (2001:1-2), in accordance with ISO 9000, quality management consists of the following activities:

- **Quality policy:** Establishing overall quality related intentions and goals of an organization.
- **Quality planning:** Setting quality objectives and specifying processes and related resources necessary to fulfill these objectives.
- **Quality control:** Executing processes to fulfill quality requirements.

- **Quality assurance:** Providing confidence these quality requirements will be fulfilled.
- **Quality improvement:** Increasing the ability to fulfill quality requirements.

The authors define quality characteristics based on quality management as "...coordinated activities to direct and control an organization with regard to quality". According to Henrichs and Aden (2001:1), data is used for decision support to ensure that subsequent analysis is done for approved user requirements. Data that does not fulfill the requirements have to be either improved or singled out. The authors state that there is no commonly accepted classification and adopted data Cleansing Intelligent Quality (CLIQ) management depicted in Figure 3.5 below is considered a 'best of breed' concept.

Figure 3.5: Data Quality Characteristics. (**Source:** Henrichs and Aden, 2001:1).

3.4.5 The approach to effective implementation of management systems

According to Johnston (2002:3-4), in order to map the ISO 9001:2000 standard, a gap analysis would be required to detail exactly what is necessary to meet the requirements of the standard. It helps to identify any gaps that exist between the standard and the existing business model or processes. Once the gaps are identified, steps need to be taken to fill those gaps and improve the overall performance of processes within the organisation. The author states that the process is initiated with a plan, followed by carrying out the plan, then checking and analysing what was done and an improvement would follow based on any weaknesses found.

Johnston (2002:4), defines a process as, "...a series of actions that result in an outcome". When all processes are combined, a system has been developed and must be managed in order to achieve the organisation's goals. According to Richter and Dibbern (2005:3), the principle of 'process approach' is defined as, "...the management of activities and related resources in a process to efficiently achieve the desired result". For product realisation organisations need a defined purpose and goal or objective. There should be a pool of resources available in the form of tools, equipment, machinery, money, people and knowledge to support the process development. The authors state that the output of a process, which is in the form of a product, information, people or decision, needs to be controlled by standards, measurements and feedback loops. The process is characterised by results as a measure of achievement, efficiency and effectiveness.

According to Stankeva (2008:2), internal audits should be conducted with the main purpose being to evaluate progress and level of implementation of the QMS in the respective departments. Another purpose is to have a prepared report on the progress of the QMS in respective departments, for a review of the QMS activities by top management once scheduled. The author states that if the audits are reassuring that the QMS functions properly in departments the organisation is able to apply to the Certifying Authorities. The operating procedures on production planning and management as well as procedures on monitoring, testing and analysis should already be finalised.

According to Mohammed and Asmoni (2006:2), some of the obstacles to implementation of a QMS include misconception of the ISO 9000 quality system; quality perceived as something secondary to the business; scheme may have appeared too complex; lack of understanding of the ISO 9000 quality standards; high cost especially the initial cost, loss of productivity of the workforce due to the effort exerted in learning and implementing the new system besides their regular duties, absence of special regulation that make it incumbent upon contracting companies to establish and implement QMS, no encouragement from the certain industry clients and difficult to apply to the some industries like construction.

According to Lacalamita (2008:1), the declared end points of quality certification to the achievement of several key objectives are listed below:

- The realization of a 'quality path' inside the organisation.
- The realization of a common platform of 'knowledge management' among all managers.
- The creation of a 'common team spirit' based on team job and on the direct participation of their results.
- The development of special attention to customer expectations with special regards to the scientific community.
- The development of interfunctional activities through a process approach.

3.4.6 Assessing the success of implementing a QMS

According to Conrad, Deubel, Kohler, Sören, and Christian (2007:1), despite the fact that the number of organisations introducing and maintaining certified QMSs have been constantly growing, more and more reports about quality problems, defective products and product call backs being encountered. Still, failures occur and there must be reasons why. Possible explanations therefore could be:

- The use of inadequate and insufficient tools or methods within the QMS.
- The tools or methods in use are not integrated deeply enough in the processes.
- The tools or methods in use are applied in an inadequate or wrong way.
- The tools or methods or even the QMS itself are not accepted and supported by the company's staff.
- There are still processes or process steps that are susceptible to failures.

According to Kleinsorge and Haas (2004:7), quality can be determined either through subjective or objective assessment criteria. In the corporate sector especially, the term 'quality' is strongly related to a technical viewpoint. It is equated with high technical performance, a proper firmness, durability and faultless functions. The author states that the level of quality is based on how technical norms and specifications are met which is objective. However, when considering service a subjective assessment criterion is necessary. In the context of performance the user of a product is the main source of quality assurance as

they express their satisfaction with a product. In this regard, the elaboration on "fitness for use" is the benchmark and center of quality assessment which becomes subjective. According to Chawane, Van Vuuren and Roodt (2003:62), organisational underperformance is influenced by a lack of insight and commitment to change programs, organisations that are not capable of learning, inflexible management thinking, neglect of the development of employees and a lack of trust in workplace relationships. These do not reflect the principles of fairness and organisational integrity, resulting in incongruent personal and organisational.

Chawane *et al.* (2003:62) citing Czander (1993), state that management frequently responds by increasing control, making threats and/or introducing reward schemes which are designed to force and/or entice employees to keep on working. The authors view organisational strategies employed to diffuse the defensive routines as a source of frustration rather than satisfying individuals' needs. Since individuals' needs are dominant, employees may undermine the organisation's tasks to obtain self gratification.

3.5 THE ROLE OF CULTURE IN CONTINUOUS IMPROVEMENT

3.5.1 The influence of culture in effective improvement plans

According to Goetsch and Davis (2002:36), ISO's definition for continuous improvement reads as follows, "...a recurring activity to increase the ability to fulfill requirement". It has become cornerstone for TQM and an explicit requirement for ISO 9000. ISO 9001:2000 Clause 8.1c clearly states that organisations shall continually improve the effectiveness of their QMS's (Goetsch & Davis, 2002:36-40). Organisations need to adopt a culture of prevention in order to eliminate the potential of future occurrence of the same nonconformities that happened before. According to Perry (2009:1), for virtually every business, an ongoing quality improvement process is a key component to improving operations and employee morale. More importantly, a concerted effort to quality improvement is an ongoing process aimed at keeping your company ahead of the competition.

Perry (2009:1), states that the process includes continuously reviewing and improving business operations and implementing incremental changes as they develop to promote ongoing quality improvements. The author views incremental changes as easier to implement and measure. Incremental quality improvement efforts can include finding ways to reduce production and/or operating costs or improve time efficiency in a single business process. According to Guo (2008:9), continuous improvement is an ongoing effort to improve products, services or processes. Continuous improvement in Chinese is referred to as *'gai shan'*, with *'Gai'* meaning 'change for the better' and *'Shan'* meaning 'benefit'. More often than not, it refers to "take it apart and put back together in a better way".

According to Guo (2008:9), among the most widely used tools for continuous improvement is a four-step quality model referred as the PDCA cycle, Figure 3.6 below, which denotes Plan, Do, Check and Act.

- **Plan:** Identify an opportunity and plan for change.
- **Do:** Implement the change on a small scale.
- **Check:** Use data to analyse the results of the change and determine whether it made a difference.
- **Act:** If the change was successful, implement it on a wider scale and continuously assess your results. If the change did not work, begin the cycle again.

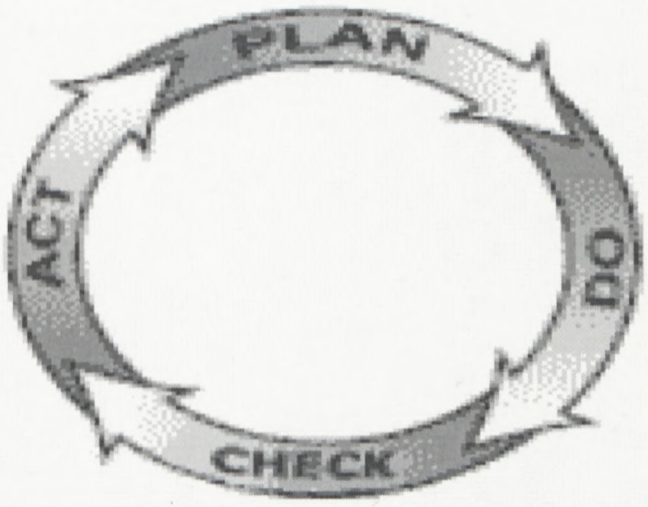

Figure 3.6: Plan-do-check-act cycle. (**Source**: Guo, 2008).

3.5.2 The influence of quality in reliability and performance

According to Rao (2006:54), another important issue in quality is the concept of reliability and the relationship between quality and reliability with belief that a high quality system generally has higher reliability. The reliability of a product or system conveys the concept of dependability, successful operation or performance, and absence of any failure. The author states that failure or mechanism of failure in a system is associated with the quality of a product. Quality on one hand, denotes conformance to specifications whereas reliability denotes absence of failure during operational phase of the product. The reliability is a statistical parameter based on failure rates, etc, which predicts the probability that the system will work without failure in the given environment.

According to Moodliyar (2008:5), organisations are required to identify areas of improvement on their QMS with an aim of increasing customer satisfaction. The information gathered from performance measurement of processes and customer satisfaction can be used to identify areas of improvement. The author believes the outcome as likely to be a success if the approach is viewed as a way to improve internal efficiencies. Moodliyar (2008:7), states that organisations should include employees in the documenting process instead of a response to external pressure from customers or governmental bodies. Involvement of employees in the process of gaining certification enhances the outcome and success.

3.6 THE INFLUENCE OF SUCCESSFUL IMPLEMENTATION OF ISO 9001 ON INTEGRATED MANAGEMENT SYSTEMS

3.6.1 Evolvement of the ISO series of standards to a unified structure (IMS)

According to Tang (2003:12-13), ISO 9000 series had achieved considerable success in motivating organisations to systematically address and improve product and service quality with the ISO 9000 series of standards. The United Nation Conference Environment and Development (UNCED) envisioned a similar set of voluntary standards to encourage the systematic improvement of environmental quality. In September 1996, the first of the ISO 14000 series of standards, ISO

14001 was issued. The development of ISO 9001 and ISO 14001 has led some organisations to look at the potential benefits of a similar route for managing occupational health and safety Smith (1996) cited by Tang (2003:13-13). In 1996 the standard BS 8800 ~ Guide to Occupational Health and Safety Management System (OH&SMS), was published. Tang (2003:26), states that although the ISO series of standards do not address culture change in organisations, few studies addressed the relationship between IMSs and organisational culture indicating strong interactions. Tang (2003:26), cites a survey conducted by Wilkinson and Dales (2000), which addressed corporate culture and the management of culture as issues which affect integration. Controversially, some organisations see the need for control and standardised systems as important where IMSs can be used as a tool which can help to bring about change.

According to Jorgensen, Mellado and Remmen (2004:8), instead of increasing the compatibility of each standard further towards a unified structure and content, a common standard could be developed. This is based on the same core aspects of management such as policy, planning, implementation, review and emphasis of focus on continuous improvement. The Integrated Management Systems (IMS) standard can be based on a common framework, extended with standards for quality, environment, occupational health & safety and social accountability which should only cover the specific demands for one area.

According to Zeng, Lou and Tam (2006:232), understanding and perception are necessary to integrate two or more management systems. Analysis of existing systems should include the status of the following:

- Integration of systems needed to optimise performance.
- Standardisation of document numbering needed to facilitate management system flow and navigation.
- Level of policy level documentation needed to ensure alignment with regulatory and corporate requirements.
- Gaps within documented programmes and regulatory and corporate requirements.
- Use of administrative controls to manage process safety management, risk management, safety, health and environmental activities.

- Documents relating to the same subject matter.
- Outdated documents.
- Documents no longer in use but still maintained in the management system.
- Accessibility of existing documentation.

Figure 3.7 below graphically depicts a model for IMS.

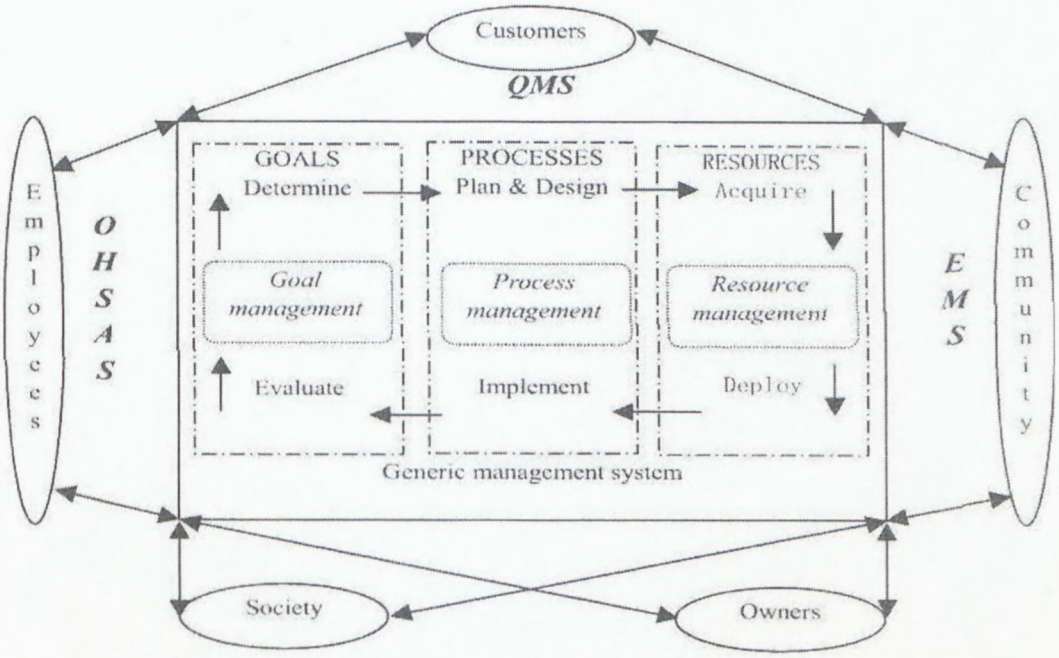

Figure 3.7: A System Model for IMS. (**Source:** Zeng, Lou and Tam 2006:232).

3.6.2 The influence of culture management in IMSs

According to Cord (2007:3), numerous rewards can be obtained by organisations from adopting IMS. It can be argued that the benefits can be grouped into two categories: internal benefits and external benefits. The internal benefits are related to the internal function and processes of the company, while the external ones are associated with the external activities of the company. Furthermore, internal benefits can be divided into three categories, namely, organisational, financial and people benefits. Similarly, the external ones are grouped into commercial, communication and quality/environmental/safety benefits. Table 3.1 below summarizes the internal benefits that a company from metallurgical industry can gain from the implementation of an IMS.

INTERNAL BENEFITS		
Organisational Benefits	Financial Benefits	People Benefits
➢ Improvement of quality of management by down-sizing three functional departments to one and reducing fuzzy management boundaries between individual systems. ➢ Increase in operational efficiency by harmonizing organizational structures with similar elements and sharing information across traditional organizational boundaries. ➢ Avoidance of duplication between procedures of systems. ➢ Streamlining paper work and communication.	➢ Cost savings by the reduction of the frequency of audits. ➢ Reduction in external certification costs over single certification audits. ➢ Increase in margins.	➢ Increase in employee motivation, awareness and qualifications. ➢ Creation of a better company image among employees.
EXTERNAL BENEFITS		
Commercial Benefits	**Communication Benefits**	**Q/E/S Benefits**
➢ Competitive advantage. ➢ Improvement of market place ➢ Gain new customers/satisfy existing ones.	➢ Improvement of company's image. ➢ Improvement of relations with stakeholders. ➢ Evidence of legal compliance	➢ Improvement in quality, environmental and health and safety ➢ Reduction of hazardous waste generation. ➢ Reduction of equipment damage and product loss.

Table 3.1: Benefits for implementation of an Integrated Management System (**Source:** Cord, 2007:3).

In the same way as benefits, the barriers to an IMS implementation can be grouped into internal (resources, attitudes/perceptions, implementation) and external (support and guidance, economics, certifiers/verifiers), Cord (2007:4). The internal barriers to IMS implementation are summarised in Table 3.2.

INTERNAL BARRIERS		
Resources	**Attitudes/Perceptions**	**Implementation**
➢ Lack of financial resources. ➢ Lack of management and/or staff knowledge, skills and training. ➢ Lack of employee involvement/ motivation. ➢ Lack of management and/or staff time.	➢ The change appears too revolutionary/ resistance to change. ➢ Low awareness of the benefits. ➢ Other priorities more important. ➢ Perception of bureaucracy. ➢ Short-term orientation.	➢ Cultural differences between disciplines. ➢ Complexity and differences among systems. ➢ High effort for implementation.
EXTERNAL BARRIERS		
Support and Guidance	**Economics**	**Certifiers/verifiers**
➢ Lack of support schemes. ➢ Lack of sector specific implementation tools and examples. ➢ Lack of experienced consultants to assist companies/poor quality information and conflicting guidance. ➢ Lack of IMS promotion.	➢ Insufficient drivers and benefits. ➢ Uncertainty about the value of IMS in the market place. ➢ Different stakeholders' demands.	➢ High costs of certification/verification ➢ Duplication of effort between certifiers/ verifiers and internal auditors.

Table 3.2: Barriers for implementation of an Integrated Management System (**Source:** Cord, 2007:4).

According to Cord (2007:5), for organisations to continue to successfully compete in the market, it is necessary for them to implement and continually improve their business and management systems performance in a sustainable way. These management systems need to be efficient and compatible with their reality, culture and the new trends in the market. The author believes that management systems need to have in their framework an efficient performance evaluation methodology to help the organisation's decision makers to get precise and right decisions, in accordance with the organisation's missions, visions, policies and objectives.

CHAPTER 4: KNOWLEDGE MANAGEMENT SURVEY DESIGN AND METHODOLOGY

4.1 THE SURVEY ENVIRONMENT

The Extrusion plant of Hulamin in Cape Town consists of various functional areas, each with a unique role in the production and delivery of aluminium profiles for and on behalf of the Hulanim group. The various functional areas, which will serve as the research environment, include the following:

- Sales,
- Administration,
- Safety and quality,
- Die maintenance,
- Extrusion Press,
- Engineering,
- Wrapping,
- Dispatch,

4.2 AIM OF THIS CHAPTER

The aim of this chapter and the survey contained therein is to determine what the key factors are that impact on the successful implementation of ISO 9001:2008 in the Epping Plant. The ultimate objective being to solve the research problem as defined in Chapter 1, Paragraph 1.3, which reads as follows:

> *"The influence of culture is adversely impacting on the success of QMS implementation".*

4.3 THE TARGET POPULATION

With any survey, it is necessary to clearly define the target population, which Collis and Hussey (2003:157), define as follows:

> *"A population is any precisely defined set of people or collection of items which is under consideration".*

- The 'sampling frame' defined by Vogt (1993) and cited by Collis and Hussey (2003:150-160), as 'a list or record of the population from which all the sampling units are drawn. For this survey, 40 employees, randomly selected from Hulamin Extrusions at various organisational levels represent the sampling frame. This transposes in 40 employees (See paragraph 4.1) being randomly selected.

The organisation has a five level hierarchy, which is made up as follows:

- **Management (PM and RSM):** The managers, responsible to top management and executives oversee the operation of the plant; support the organisations' directors and top management of the business divisional area.
- **Head of Departments (HOD) and Planner:** Responsible to management (PM) and Top management and manages a functional area.
- **Sales Team and Draughtsman:** Responsible to management (RSM) and Top management and manages a functional area.
- **Team Leaders (T/L):** Responsible to HODs and manages a business unit within a functional area.
- **Staff:** Shop floor personnel responsible for carrying out production duties.

The target population was specifically chosen in order to validate the practicality of the concepts as presented here. The risk of bias, which cannot be statistically eliminated, is recognised by the author based on the very definition of the target population as well as the number of respondents selected.

4.4 DATA COLLECTION

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

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

Primary data or evidence will be collected using self-administered questionnaires, which fall within the ambit of a broader definition of 'survey research' or 'descriptive survey'. The concept of survey is defined by Remenyi *et al.* (2002:290) as: "...the collection of a large quantity of evidence usually numeric, or evidence that will be converted into numbers, normally by means of a questionnaire. A questionnaire is a list of carefully structured questions, chosen after considerable testing with a view to elicit reliable responses from a chosen sample. The aim is to establish what a group of participants do, think or feel. A positivistic approach suggests structured 'closed' questions, while a phenomenological approach suggests unstructured 'open-ended' questions. In this research a positivistic approach will be used. The evidence collected could suggest ways in which the organisation could improve the implementation strategy.

The data collection method used in the survey, falls within the context of a survey, defined by Hussey and Hussey (1997), as:

> *"A sample of subjects being drawn from a population and studied to make inferences about the population"*

More specific, the survey conducted in this dissertation falls within the ambit of the 'descriptive survey' as defined by Ghauri, Grønhaug and Kristianslund (1995). The data collection method used fall within the ambit of both the definitions attributed to the concepts 'survey' and 'field study'. 'Survey', according to Gay and Diebl (1992:238), is an attempt to collect data from members of a population in order to determine the current status of that population with respect to one or

more variables, while Kerlinger (1986:372), define 'field study' as non-experimental scientific inquiries aimed at discovering the relations and interactions among ... variables in real ... structures. As in the case of most academic research, the collection of data forms an important part of the overall dissertation content.

4.5 MEASUREMENT SCALES

The survey will be based on the well-known Lickert scale, whereby respondents were asked to respond to questions or statements (Parasuraman 1991:410) in order to determine consensus, probability and importance. The Lickert scale was chosen due to its ability to be used in both respondent-centred (how responses differ between people) and stimulus-centred (how responses differ between various stimuli) studies, most appropriate to glean data in support of the research problem in question (Emory and Cooper 1995:180-181). According to Emory and Cooper (1995:180-181), the advantages in using the Lickert scale are:

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

According to Remenyi, Money and Twite (1995:224), interval scales facilitate meaningful statistics when calculating means, standard deviation and Pearson correlation coefficients. To generate a significant amount of data, other means such as rated responses and numeric scales will also be used.

4.6 THE DEMAND FOR A QUALITATIVE RESEARCH STRATEGY

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

- **Practicality:** Practicality is concerned with a wide range of factors of economy, convenience and interpretability.
- **Validity:** Validity refers to the extent to which a test measures what we actually wish to measure. Yin (2003:34), identifies 3 subsets to the concept validity, namely: Construct validity, internal validity and external validity.
- **Reliability:** Reliability has to do with the accuracy and precision of a measurement procedure.

4.7 SURVEY SENSITIVITY

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

- A qualitative investigation of a particularly sensitive nature conducted by Oskowitz and Meulenberg-Buskens (1997:83), qualified the importance of handling mission critical issues as identified above when the authors stated:

> *"Thus any type of qualitative investigation could benefit from the researchers being skilled and prepared, and the sensitive nature of an investigation into a stigmatizing condition made the need for such an undertaking even more imperative in the current study".*

- The sensitivity of certain issues and issues identified as impacting the research negatively in the environments being evaluated, not only demand intimate personal involvement, but also demand the 'personal and practical experience' of the researcher. According to Meulenberg-Buskens (1997:94), it is imperative to assure quality in qualitative research being undertaken. Checkland (1989:152), supports this view however extends the concept with the opinion that: "The researcher becomes a participant in the action, and the process of change itself becomes the subject of research".

4.8 SURVEY DESIGN

Collis and Hussey (2003:60), is of the opinion that, 'if research is to be conducted in an efficient manner and make the best of opportunities and resources available, it must be organised. Furthermore, if it is to provide a coherent and logical route to a reliable outcome, it must be conducted systematically using appropriate methods to collect and analyse the data. A survey should be designed in accordance with the following stages:

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

The survey design to be used in this instance is that of the descriptive survey as opposed to the analytical survey. The descriptive survey is according to Collis and Hussey (2003:10), frequently used in business research in the form of attitude surveys. The descriptive survey as defined by Ghauri, Grønhaug and Kristianslund (1995:60), has furthermore the characteristics to indicate how many members of a particular population have a certain characteristic. Particular care was taken to avoid bias in the formulation of the questions.

The statements within the survey have been designed to be concise and with the following principles in mind:

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

4.9 THE VALIDATION SURVEY QUESTIONS

The author has developed survey questionnaires to determine the level of understanding of the requirements of the QMS being implemented. Questions were prepared and piloted to ensure they reflected a high degree of 'validity' (Babbie, 2005:285).

4.9.1 Questionnaire on implementation of a QMS (ISO 9001:2008).

Question 1: Our quality objectives are specific and consistent to the overall quality goal of the organization. To what extent do you agree with this statement?
Question 2: I am pleased with the training I received in terms of my job. To what extent do you agree with this statement?
Question 3: To what extent do you perform your duties according to Standard Operating Procedures?
Question 4: How important are your duties in contributing to quality improvement?
Question 5: Rate the extent to which Top Management provides you with the necessary tools to do your job satisfactorily.
Question 6: The implementation of ISO 9001 will improve the organisation's product quality. To what extent do you agree with this statement?
Question 7: To what extent is it necessary to maintain records of results for quality inspections done on each lot produced?
Question 8: Working with experience is more important than adhering to standard procedures. To what extent do you agree with this statement?
Question 9: My job only ends with my primary tasks. To what extent do you agree with this statement?
Question 10: All employees work together to take ownership of quality. To what extent do you agree with this statement?
Question 11: To what extent are production processes efficient to produce the required product quality?

Question 12: Product quality is frequently compromised. To what extent do you agree with this statement?

Question 13: Defects are always identified and isolated timeously throughout the production process. To what extent do you agree with this statement?

Question 14: To what extent are inspections to ascertain conformance to customer requirements executed as required?

Question 15: Non-conformity control is adequate to prevent dispatch to the customer. To what extent do you agree with this statement?

Question 16: Corrected non conformances are prevented from recurring. To what extent do you agree with this statement?

Question 17: I should try to endeavour to solve a problem even if it was created by someone else. To what extent do you agree with this statement?

Question 18: Revision of procedures improves employee understanding of their jobs. To what extent do you agree with this statement?

Question 19: There is a need to change processes or procedures that have been used for a long time in order to facilitate improvement. To what extent do you agree with this statement?

Question 20: My role in the supply chain is important to the next person. To what extent do you agree with this statement?

Question 21: My concerns are adequately addressed by management. To what extent do you agree with this statement?

4.10 CONCLUSION

In this chapter, the 'QMS Implementation' survey design and methodology was addressed under the following functional headings:

- Survey environment.
- Aim of the chapter.
- Choice of sampling method.
- Target population.
- Data collection.
- Measurement scales.
- Demand for a qualitative research strategy.

- Survey sensitivity.
- Survey design.
- Survey questions.

In Chapter 5, results from the survey will be analysed in terms of descriptive and inferential statistics.

CHAPTER 5: DATA ANALYSIS AND INTERPRETATION OF RESULTS

5.1 INTRODUCTION

This chapter focuses on the analysis of the survey conducted amongst top management in the Aluminium Extrusion Plant regarding the influence of culture on the success of a QMS implementation. A data obtained from the completed questionnaires by respondents from the Hulamin Extrusions Plant (Refer Chapter 4) will be presented and analysed.

To serve the purpose of this research, descriptive and inferential statistics were used to analyse the data. Furthermore, the data has been analysed by using SAS software.

5.2 ANALYSIS METHOD

5.2.1 VALIDATION OF SURVEY RESULTS

A descriptive analysis of the survey results returned by the research questionnaire respondents are reflected below. The responses to the questions obtained through the questionnaires are indicated in table format for ease of reference. The database was developed in order to test for responses that were out of the set boundaries. A database in which the data was captured was developed so that data validation is insured with build-in boundaries and rules so that any mistakes made by the data capturer, could be detected. Other measures to ensure data validity is to capture the information twice and then compare to see whether any mistakes were made and correct it. Data validation is the process of ensuring that a program operates on clean, correct and useful data.

The construct validation however can only be taken to the point where the questionnaire measure what it is suppose to measure. Construct validation should be addressed in the planning phases of the survey and when the questionnaire is developed. This questionnaire is aimed to determine the impact of culture on the successful implementation of quality management systems at the Hulamin Extrusions Plant.

5.2.2 DATA FORMAT

The data was provided in its original format of questionnaires, which was captured on a Microsoft Access database. It was then imported into SAS-format through the SAS ACCESS module. This information was analysed by the custodian of this document.

5.2.3 PRELIMINARY ANALYSIS

The reliability of the variables (statements) in this survey is tested by using the Cronbach Alpha tests (See Paragraph 5.3.1). Descriptive statistics was performed on all variables; displaying means, standard deviations, frequencies, percentages, cumulative frequencies and cumulative percentages. These descriptive statistics and graphical displays can be found in Paragraph 5.3.2. (See also computer printout in Annexure A).

5.2.4 INFERENTIAL STATISTICS

The following inferential statistics are performed on the data:

- Cronbach Alpha test.
- Pearson Chi-square as a measure of association between the groups where nominal data was encountered and an expected frequency of more than 5 were displayed in the cells.
- Kruskal Wallis test for interval data with more than 2 independent samples. The Kruskal-Wallis one-way analysis of variance by ranks is a non-parametric method for testing equality of population medians among groups. Intuitively, it is identical to a one-way analysis of variance with

the data replaced by their ranks. It is an extension of the Mann-Whitney U test to 3 or more groups. Since it is a non-parametric method, the Kruskal-Wallis test does not assume a normal population, unlike the analogous one-way analysis of variance. However, the test does assume an identically-shaped and scaled distribution for each group, except for any difference in medians.

5.2.5 TECHNICAL REPORT WITH GRAPHICAL DISPLAYS

This report is written with explanations of all variables and their outcome. Comparisons are performed where required and statistical probabilities are attached to indicate the magnitude of differences or associations. All inferential statistics are discussed in Paragraph 5.3.4.

5.2.6 ASSISTANCE TO RESEARCHER

The conclusions made by the researcher, was validated by the statistical report. Help was provided to interpret the outcome of the data. The final report written by the researcher was validated and checked by a qualified statistician to exclude any misleading interpretations.

5.2.7 SAMPLE

The target population is represented by employees from the Hulamin Extrusions Plant. The sample that was realized eventually is 38.

5.3 ANALYSIS

In total 38 respondents answered the questionnaire. The items (statements) in the questionnaires will be tested for reliability, in the following paragraph.

5.3.1 RELIABILITY TESTING

Cronbach's Alpha is an index of reliability associated with the variation accounted for by the true score of the "underlying construct". Construct is the hypothetical variables that are being measured (Cooper and Schindler, 2006:216-217). More specific, Cronbach's alpha measures how well a set of items (or variables) measures a single uni-dimensional latent construct.

A reliability test (Cronbach's Alpha Coefficient) was executed on the statements (items) made in terms of the QMS implementation at the Aluminium Extrusion plant. The Cronbach's Alpha Coefficients are reported in Table 5.1 shows that the measuring instrument is not consistent. This however proves that the questionnaire may by multi dimensional and it measures more than one construct. This problem was dealt with by determining whether there are more dimensions in which this questionnaire operates in (more specific that the statements describe more than one latent variable), by doing a factor analysis on the questionnaire or by deleting the items that add to the inconsistency of the questionnaire. The latter was done and the results are presented in Table 5.2.

Shown in Table 5.1 are the results of the Cronbach alpha when the variables are standarised due to different scales for the statements used as measuring instrument for the questionnaire. It shows the correlation between the respective item and the total sum score (without the respective item) and the internal consistency of the scale (coefficient alpha) if the respective item would be deleted. By deleting the items (statements) one by one each time with the statement with the highest Cronbach Alpha value, the Alpha value will increase. In the right-most column of Table 5.1, it can be seen that the reliability of the scale would be higher if any of these statements is deleted. Thus, the items (statements) will be deleted from the scale, one by one, until a final set that makes up a reliable scale is attained. (Note the fewer items in a scale, the less reliable the scale)

After deleting statements q01, q02, q05, q07, q10, q12, q13, q17, q18, q19, q20 and q21 the alpha coefficients were calculated on the remaining items (statements) and the results showing a Cronbach's alpha coefficient of more than 0.70 are shown in Table 5.2.

TABLE 5. 1: Cronbach's Alpha Coefficient for the questionnaire.

Statements	Variable nr.	Correlation with total	Cronbach's Alpha Coefficient
1. Our quality policy is specific to the overall quality goal of the organization.	Q01	0.0612	0.4289
2. I am pleased with the training I received in terms of my job.	Q02	-0.4598	0.5302
3. To what extent do you perform your duties according to Standard Operating Procedures?	Q03	0.2994	0.3762
4. How important are your duties in contributing to quality improvement.	Q04	0.2393	0.3899
5. Rate the extent to which Top Management provides you with the necessary tools to do your job satisfactorily.	Q05	-0.1272	0.4677
6. The implementation of ISO 9001 will improve the organisation's product quality.	Q06	0.4220	0.3474
7. To what extent is it necessary to maintain records of results for quality inspections done on each lot produced?	Q07	0.2365	0.3905
8. Working with experience is more important than adhering to standard procedures.	Q08	0.1356	0.4129
9. My job only ends with my primary tasks.	Q09	0.1834	0.4024
10. All employees work together to take ownership of quality.	Q10	0.0442	0.4325
11. To what extent are production processes efficient to produce the required product quality?	Q11	0.2939	0.3774
12. Product quality is frequently compromised.	Q12	0.0438	0.4326
13. Defects are always identified and isolated timeously throughout the production process.	Q13	0.0981	0.4210
14. To what extent are inspections to ascertain conformance to customer requirements executed	Q14	0.2535	0.3867

Statements	Variable nr.	Correlation with total	Cronbach's Alpha Coefficient
as required?			
15. Non-conformity control is adequate to prevent dispatch to the customer.	Q15	0.3982	0.3531
16. Corrected non conformances are prevented from recurring.	Q16	0.2500	0.3874
17. I should try to endeavour to solve a problem even if it was created by someone else.	Q17	0.0445	0.4324
18. Revision of procedures improves employee understanding of their jobs.	Q18	0.1715	0.4050
19. There is a need to change processes or procedures that have been used for a long time in order to facilitate improvement.	Q19	-0.1533	0.4728
20. My role in the supply chain is important to the next person.	Q20	0.3670	0.3604
21. My concerns are adequately addressed by management.	Q21	-0.1275	0.4677
Cronbach's Coefficient Alpha for standardized variable			**0.4282**

TABLE 5. 2: Cronbach's Alpha Coefficient for the questionnaire with deleted statements.

Statements	Variable nr.	Correlation with total	Cronbach's Alpha Coefficient
3. To what extent do you perform your duties according to Standard Operating Procedures?	Q03	0.4880	0.6888
4. How important are your duties in contributing to quality improvement.	Q04	0.3071	0.7207
6. The implementation of ISO 9001 will improve the organisation's product quality.	Q06	0.2792	0.7254
8. Working with experience is more important than adhering to standard procedures.	Q08	0.3449	0.7142
9. My job only ends with my primary tasks.	Q09	0.2783	0.7255
11. To what extent are production processes efficient to produce the required product quality?0.7047	Q11	0.3990	0.7047

Statements	Variable nr.	Correlation with total	Cronbach's Alpha Coefficient
14. To what extent are inspections to ascertain conformance to customer requirements executed as required?	Q14	0.4494	0.6958
15. Non-conformity control is adequate to prevent dispatch to the customer.	Q15	0.5799	0.6717
16. Corrected non conformances are prevented from recurring.	Q16	0.5110	0.6845
Cronbach's Coefficient Alpha for standardized variable			**0.7282**

The variables (items) in Table 5.2 deems to be reliable and thus measure one construct.

Although an analysis was conducted in the following paragraph on the questions that were deleted in this paragraph, it is of importance to note that if this survey had to be repeated under the same conditions at the same population, the results may differ due to inconsistency and measurement of multi constructs.

5.3.2 DESCRIPTIVE STATISTICS

In Table 5.3 the descriptive statistics for all the variables in the questionnaire are shown, with the frequencies in each category and the percentage out of total questionnaires. It is of importance to note that the descriptive statistics are based on the total sample. In some cases there were no answers given (left blank) in the questionnaire. These are shown as "unknown". These descriptive statistics are also shown in Annexure A.

TABLE 5. 3: Descriptive statistics for client responses

Variables	Categories	Frequency	Percentage out of total
Position	Management	3	8.1%
	Line management	6	16.2%
	Employees	28	75.7%

Variables	Categories	Frequency	Percentage out of total
1. Our quality policy is specific to the overall quality goal of the organization.	Strongly agree	9	23.8%
	Agree	15	39.5%
	Undecided	7	18.4%
	Disagree	6	15.8%
	Strongly disagree	0	0.0%
	Unknown	1	2.6%
2. I am pleased with the training I received in terms of my job.	Pleased 5	3	7.9%
	Pleased 4	2	5.3%
	Pleased 3	3	7.9%
	Pleased 2	5	13.2%
	Pleased 1	4	10.5%
	Displeased 1	7	18.4%
	Displeased 2	5	13.2%
	Displeased 3	3	7.9%
	Displeased 4	2	5.3%
	Displeased 5	3	7.9%
	Unknown	1	2.6%
3. To what extent do you perform your duties according to Standard Operating Procedures?	To a great extent	23	60.5%
	Some what	10	26.3%
	Very little	4	10.5%
	Not at all	1	2.6%
4. How important are your duties in contributing to quality improvement.	Very important	27	71.1%
	Important	10	26.3%
	Of little importance	0	0.0%
	Unimportant	0	0.0%
	Unknown	1	2.6%
5. Rate the extent to which Top Management provides you with the necessary tools to do your job satisfactorily.	Good 5	6	15.8%
	Good 4	6	15.8%
	Good 3	7	18.1%
	Good 2	9	23.7%
	Good 1	1	2.6%
	Poor 1	2	5.3%
	Poor 2	1	2.6%

Variables	Categories	Frequency	Percentage out of total
	Poor 3	0	0.0%
	Poor 4	1	2.6%
	Poor 5	2	5.3%
	Unknown	3	790%
6. The implementation of ISO 9001 will improve the organisation's product quality.	Strongly agree	18	47.4%
	Agree	17	44.7%
	Undecided	3	7.9%
	Disagree	0	0.0%
	Strongly disagree	0	0.0%
7. To what extent is it necessary to maintain records of results for quality inspections done on each lot produced?	Definitely	33	86.8%
	Probably	4	10.5%
	Possibly	1	2.6%
	Probably not	0	0.0%
	Definitely not	0	0.0%
8. Working with experience is more important than adhering to standard procedures.	Very important	9	23.7%
	Important	9	23.7%
	Of little importance	12	31.6%
	Unimportant	5	13.2%
	Very unimportant	2	5.3%
	Unknown	1	2.6%
9. My job only ends with my primary tasks.	Strongly agree	3	7.9%
	Agree	3	7.9%
	Undecided	0	0.0%
	Disagree	16	42.1%
	Strongly disagree	14	36.8%
	Unknown	2	5.3%
10. All employees work together to take ownership of quality.	Strongly agree	14	36.8%
	Agree	11	29.0%
	Undecided	1	2.6%
	Disagree	10	26.3%
	Strongly disagree	2	5.3%
11. To what extent are production processes efficient to produce the	To a great extent	18	47.4%
	Some what	16	42.1%

Variables	Categories	Frequency	Percentage out of total
required product quality?	Very little	3	7.9%
	Not at all	0	0.0%
	Unknown	1	2.6%
12. Product quality is frequently compromised.	To a great extent	11	29.0%
	Some what	20	52.6%
	Very little	5	13.2%
	Not at all	2	5.3%
13. Defects are always identified and isolated timeously throughout the production process.	Mostly agree	9	23.7%
	Agree	10	26.3%
	Undecided	6	15.8%
	Disagree	4	10.5%
	Mostly disagree	8	21.0%
	Unknown	1	2.6%
14. To what extent are inspections to ascertain conformance to customer requirements executed as required?	Mostly agree	17	44.7%
	Agree	13	34.2%
	Undecided	7	18.4%
	Disagree	1	2.6%
	Mostly disagree	0	0.0%
15. Non-conformity control is adequate to prevent dispatch to the customer.	Mostly agree	19	50.0%
	Agree	4	10.5%
	Undecided	7	18.4%
	Disagree	5	13.2%
	Mostly disagree	2	5.3%
	Unknown	1	2.6%
16. Corrected non conformances are prevented from recurring.	Mostly agree	17	44.7%
	Agree	9	23.7%
	Undecided	4	10.5%
	Disagree	5	13.2%
	Mostly disagree	3	7.9%
17. I should try to endeavour to solve a problem even if it was created by someone else.	To a great extent	31	81.6%
	Some what	5	13.2%
	Very little	1	2.6%
	Not at all	1	2.6%

Variables	Categories	Frequency	Percentage out of total
18. Revision of procedures improves employee understanding of their jobs.	To a great extent	29	76.3%
	Some what	8	21.1%
	Very little	1	2.6%
	Not at all	0	0.0%
19. There is a need to change processes or procedures that have been used for a long time in order to facilitate improvement.	To a great extent	22	57.9%
	Some what	11	29.0%
	Very little	3	7.9%
	Not at all	1	2.6%
	Unknown	1	2.6%
20. My role in the supply chain is important to the next person.	Very important	34	89.5%
	Important	4	10.5%
	Of little importance	0	0.0%
	Unimportant	0	0.0%
21. My concerns are adequately addressed by management.	Mostly agree	11	29.0%
	Agree	12	31.6%
	Undecided	2	5.3%
	Disagree	7	18.4%
	Mostly disagree	6	15.8%

In Table 5.4 the means and standard deviations for all the statements measuring the perceptions in the survey are shown in order to determine central location.

TABLE 5. 4: Descriptive statistics on all statements regarding respondents perceptions

Statements	N	Median	Mean	Std Dev	Range
1. Our quality policy is specific to the overall quality goal of the organization.	37	2	2.27	1.0179	3
2. I am pleased with the training I received in terms of my job.	37	5	5.46	2.5451	9
3. To what extent do you perform your duties according to Standard Operating Procedures?	38	1	1.55	0.7952	3
4. How important are your duties in contributing to quality improvement.	37	1	1.27	0.4502	1
5. Rate the extent to which Top Management	35	3	2.17	2.7277	10

Statements	N	Median	Mean	Std Dev	Range
provides you with the necessary tools to do your job satisfactorily.					
6. The implementation of ISO 9001 will improve the organisation's product quality.	38	2	1.61	0.6384	2
7. To what extent is it necessary to maintain records of results for quality inspections done on each lot produced?	38	1	1.16	0.4366	2
8. Working with experience is more important than adhering to standard procedures.	37	3	2.51	1.1696	4
9. My job only ends with my primary tasks.	36	4	3.97	1.2302	4
10. All employees work together to take ownership of quality.	38	2	2.34	1.3612	4
11. To what extent are production processes efficient to produce the required product quality?	37	2	1.59	0.6438	2
12. Product quality is frequently compromised.	38	2	1.95	0.8036	3
13. Defects are always identified and isolated timeously throughout the production process.	37	2	2.78	1.4932	4
14. To what extent are inspections to ascertain conformance to customer requirements executed as required?	38	2	1.79	0.8433	3
15. Non-conformity control is adequate to prevent dispatch to the customer.	37	1	2.11	1.3288	4
16. Corrected non conformances are prevented from recurring.	38	2	2.16	1.3462	4
17. I should try to endeavour to solve a problem even if it was created by someone else.	38	1	1.26	0.6445	3
18. Revision of procedures improves employee understanding of their jobs.	38	1	1.26	0.5032	2
19. There is a need to change processes or procedures that have been used for a long time in order to facilitate improvement.	37	1	1.54	0.7672	3
20. My role in the supply chain is important to the next person.	38	1	1.10	0.3110	1
21. My concerns are adequately addressed by management.	38	2	2.60	1.4803	4

5.3.3 UNI-VARIATE GRAPHS

The responses are displayed in the following graphs. It is important to note that these graphs are based on the total sample.

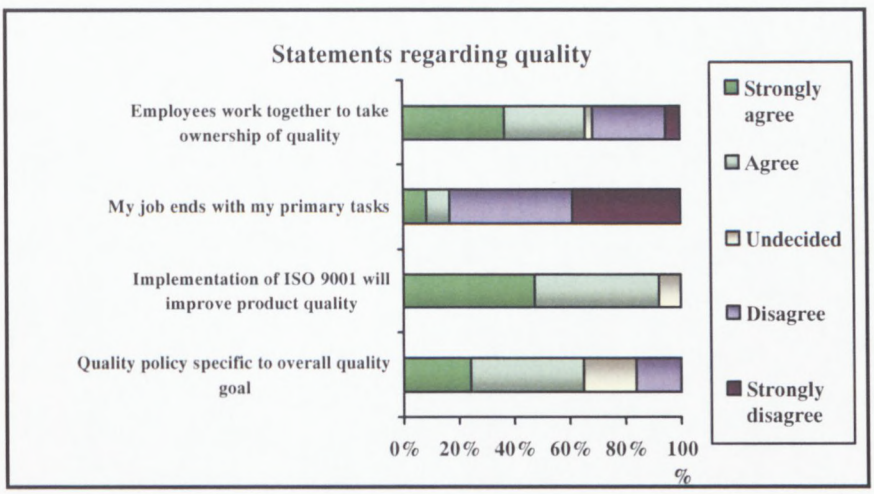

FIGURE 5.1: 100% stack bar for responses on quality statements

Most of the respondents (92.1%) indicated that the implementation of ISO 9001 will improve the organisations product quality. More than 60% of the respondents indicated that the quality policy is specific to the overall quality goal of the organisation and that employee's work together to take ownership of quality. Nearly 80 % of the respondents do not think that their job ends with their primary tasks.

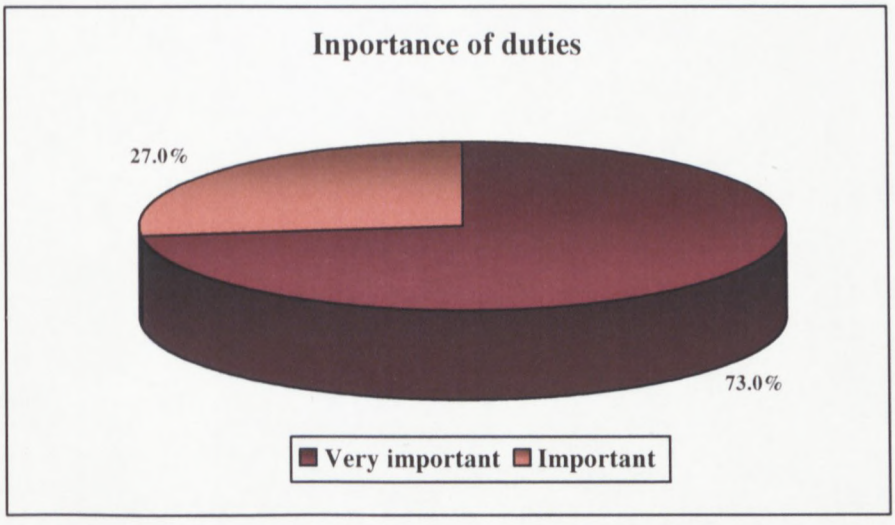

FIGURE 5.2: Pie with 3D visual effect for rating of duty importance

All the respondents thought that it is important (27.0%) to very important (73.0%) that their duties contribute to quality improvement.

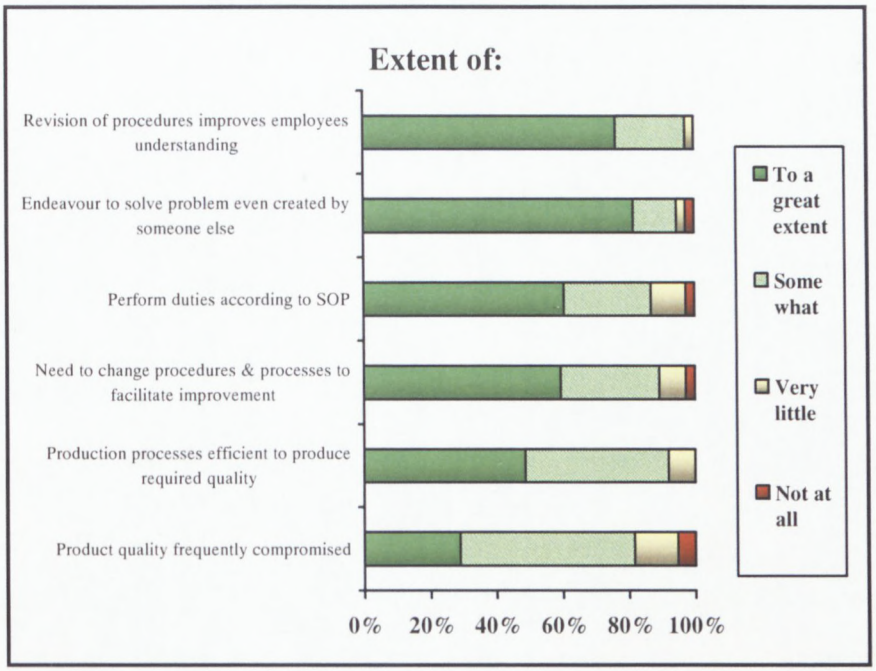

FIGURE 5.3: 100% stack bar for extent of

The respondents agree to strongly agree with the following statements:

- Revision of procedures improves employee understanding of their jobs (97.4%).
- I should try to endeavour to solve a problem even if it was created by someone else (97.8%).
- Perform your duties according to Standard Operating Procedures (86.8%).
- There is a need to change processes or procedures that have been used for a long time in order to facilitate improvement (86.9%).
- Production processes are efficient to produce the required product quality (89.5%).
- Product quality is frequently compromised (81.6%).

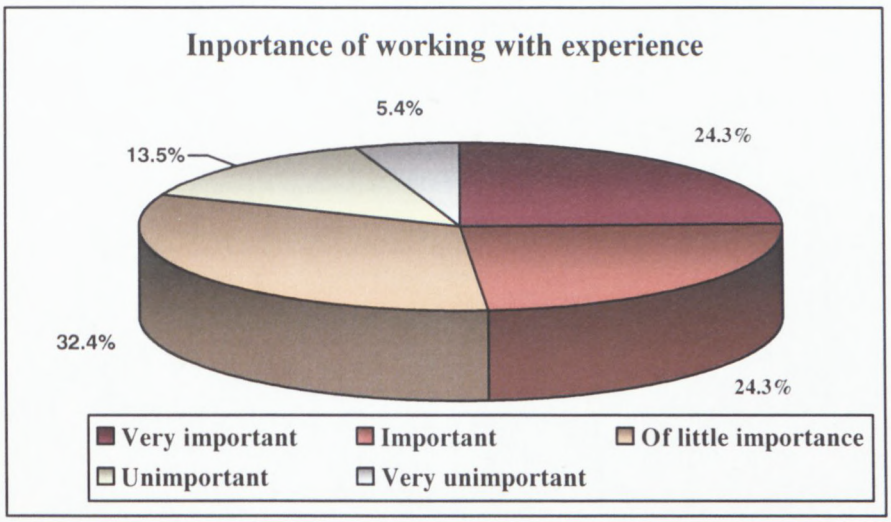

FIGURE 5.4: Pie with 3D visual effect for importance of working with experience

There seems to be a 50 / 50 split regarding whether working with experience is more important than adhering to standard procedures. Although a third indicated that it is of little importance nearly 50% indicated that it is important to very important. Nearly 19% indicated unimportant to very unimportant.

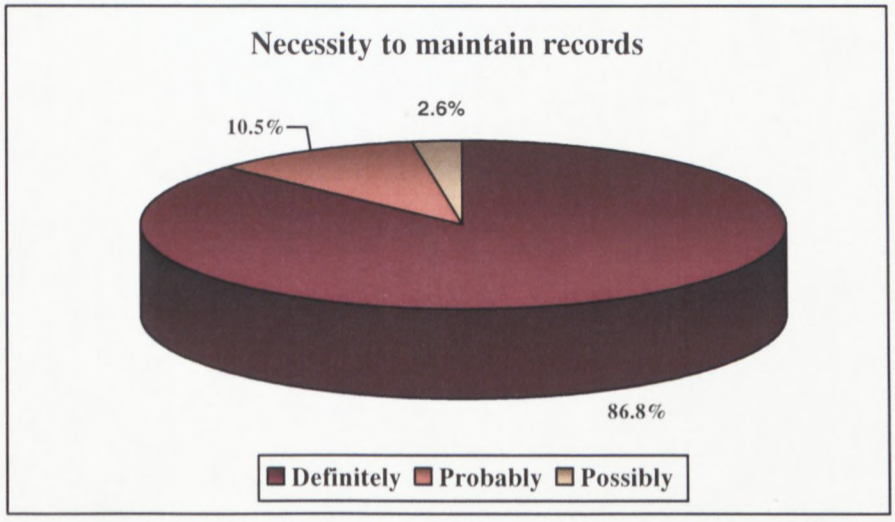

FIGURE 5.5: Pie with 3D visual effect for necessity to maintain records

Most of the respondents (86.8%) indicated that records of results for quality inspections done on each lot produced should definitely be maintained.

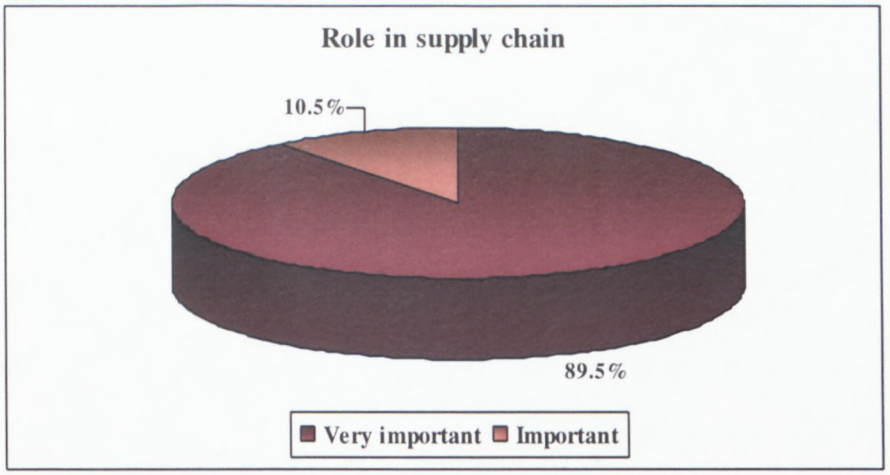

FIGURE 5. 6: Pie with 3D visual effect for role in supply chain

Most of the respondents (89.5%) indicated that their role in the supply chain is very important to the next person.

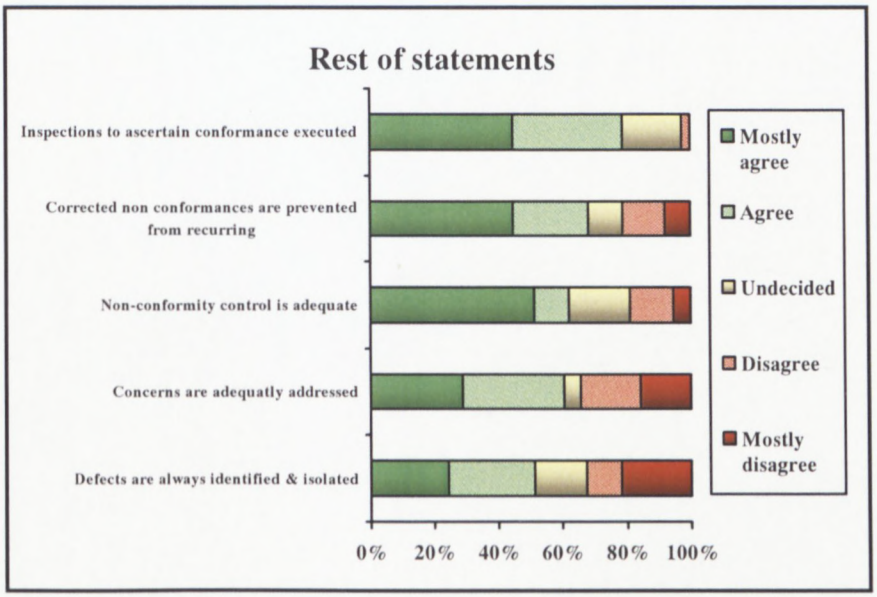

FIGURE 5.7: 100% stack bar for rest of statements

The respondents agree to mostly agree to the following statements (Indicated according to the degree of which they agreed):

- Inspections to ascertain conformance to customer requirements executed as required (78.9%).
- Corrected non conformances are prevented from recurring (68.4%).
- Non-conformity control is adequate to prevent dispatch to the customer (60.5%).

- My concerns are adequately addressed by management (60.6%)
- Defects are always identified and isolated timeously throughout the production process (50.0%).

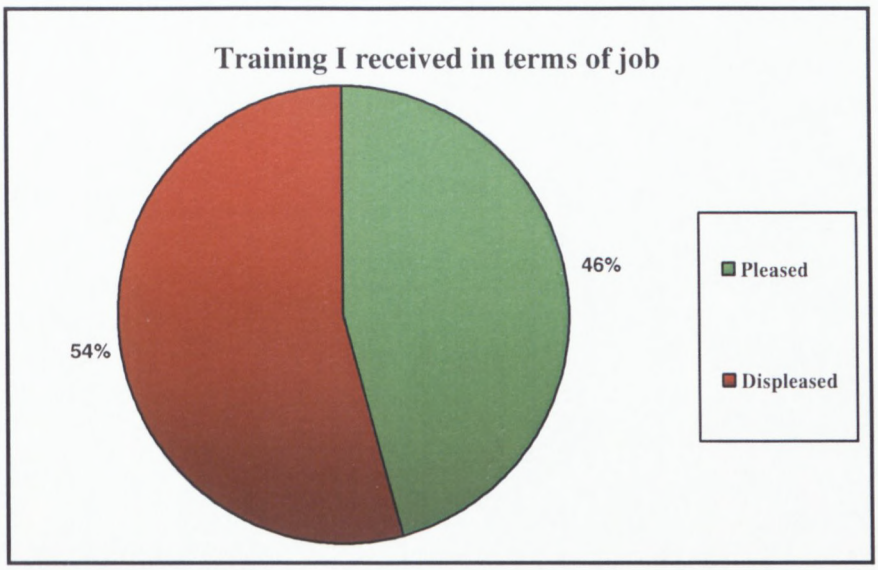

FIGURE 5.8: 100% stack bar for training received in terms of job

There were a little more respondents who were displeased than pleased with the training they received to their jobs.

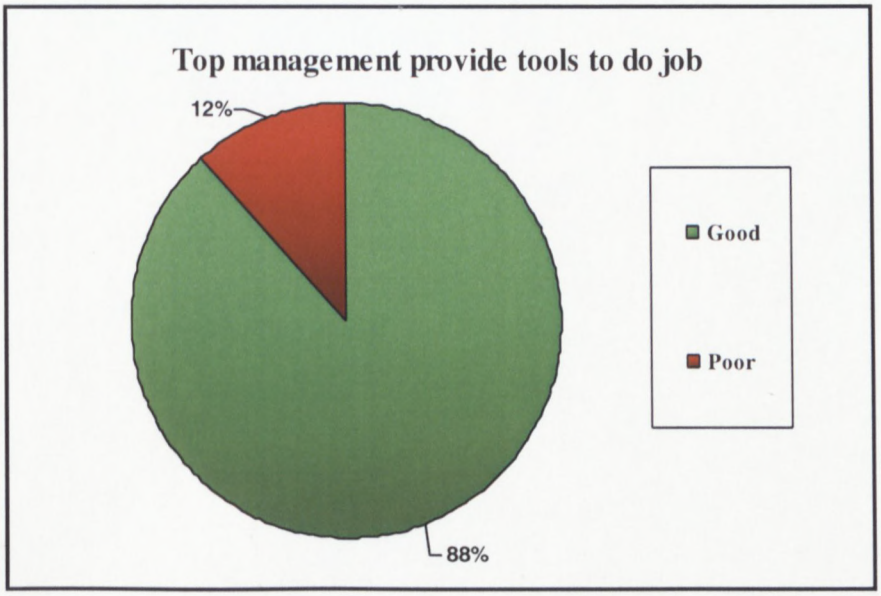

FIGURE 5.9: 100% stack bar for top management providing tools

Most of the respondents (88.0%) indicated that top management provide them with the tools to do their job satisfactorily.

5.3.4 COMPARATIVE STATISTIC

Comparisons were made between management, line management and employees with respect to their responses to the statements. Statistically significant differences were found between the groups for the following statements:

- To what extent do you perform your duties according to Standard Operating Procedures?
- Non-conformity control is adequate to prevent dispatch to the customer.
- Corrected non conformances are prevented from recurring.

These statistically significant results are shown in Table 5.5 and all the tests are shown in Annexure C.

TABLE 5.5: Kruskal Wallis test for statistically significant comparisons between position for q03, q15 and q16.

Question / Statement	Sample Size	Chi-Square	DF	P-Value
Comparisons between the different positions				
3. To what extent do you perform your duties according to Standard Operating Procedures?	37	21.8662	2	<0.0001***
15. Non-conformity control is adequate to prevent dispatch to the customer	36	7.0866	2	0.0289*
15. Corrected non conformances are prevented from recurring.	37	8.8256	2	0.0121*

This Kruskal Wallis test indicates that more employees score q03 "To what extent do you perform your duties according to Standard operating procedures", statistically significantly lower than the management and line management groups, which means that employees perform this to a great extent, whiles the management and the line management only some what and very little. The Kruskal Wallis test also indicated that statistically significantly more employees slightly agree to mostly agree than management and line management that "non-conformity control is adequate to prevent dispatch to the customer". Statistically significantly more employees slightly agree to mostly agree than management and line management that "Corrected non conformances are prevented from recurring".

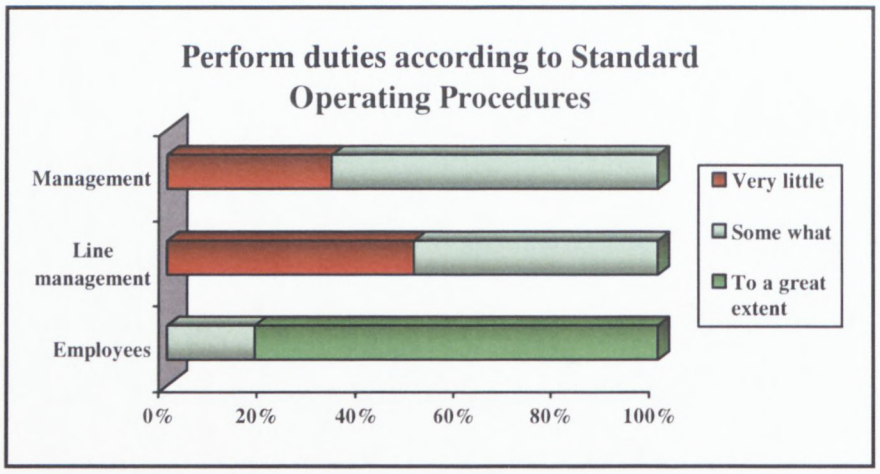

FIGURE 5.10: 100% stack bar for position versus Q03

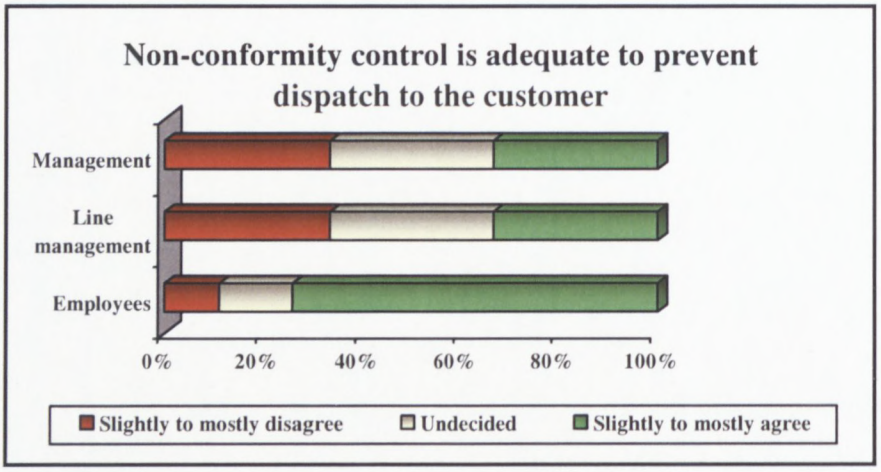

FIGURE 5.11: 100% stack bar for position versus Q15

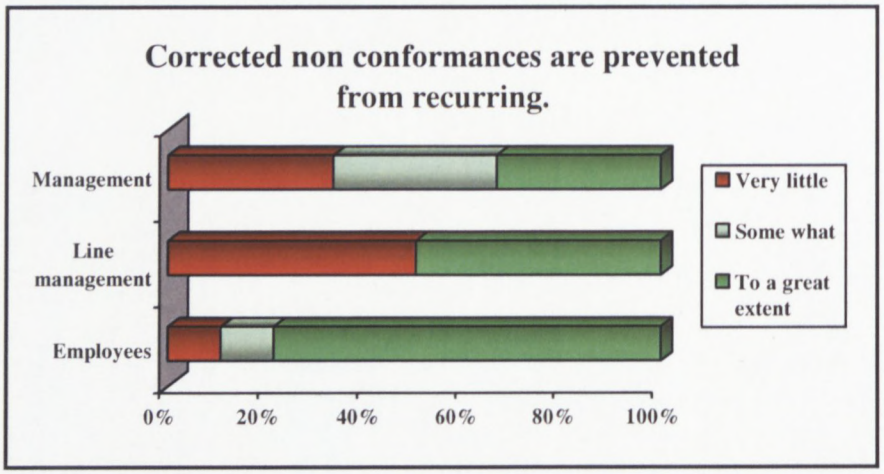

FIGURE 5.12: 100% stack bar for position versus Q16

5.4 FINDINGS AND CONCLUSION

The following analogies can be drawn from this analysis of the survey respondents:

- Although only about 50% of the respondents were pleased with the training they received on the job, they believe that top management provides the tools to do their job satisfactorily and their concerns are adequately addressed by management.
- The employees of the organisation do not think that their job ends with their primary tasks. They think that it is important that their duties contribute to quality improvement, that they should try to endeavour to solve a problem, even if it was created by someone else, that their role in the supply chain is very important and that they are working together to take ownership of quality.
- Revision of procedures improves the employees' understanding of their jobs.
- Although the employees of the target organisation perform their duties according to standard operating procedures, it still seems important to very important to them that working based on experience is more important than adhering to standard procedures.
- Records of results for quality inspections done on each lot produced, should be maintained.
- The implementation of ISO 9001 will improve the organisations product quality, and the quality policy is specific to the overall quality goal of the organisation
- Although product processes are efficient to produce the required quality, product quality is frequently compromised and there is a need to change processes or procedures that have been used for a long time in order to facilitate improvement.
- Inspections to ascertain conformance to customer requirements are executed as required, corrected non conformances are prevented from recurring, non-conformity control is adequate to prevent dispatch to the customer and defects are always identified and isolated timeously throughout the production process.

Management (Top and line) however believe that the status quo is different to that portrayed by the above observations. The following serve as examples:

- The extent of performance of duties according to standard operating procedures.
- Whether non-conformity control is adequate to prevent dispatch to the customer.
- Whether corrected non conformances are prevented from recurring.

CHAPTER 6: CONCLUSION

6.1 INTRODUCTION

The research thus far has elaborated on the importance of culture and change management for organisations to facilitate improvement. A QMS has been defined as, "...a set of coordinated activities to direct and control an organisation in order to continuously improve the effectiveness and efficiency of its performance. The literature review indicates that the key factors pertaining to ISO 9001 include, processes (their sequence and interaction), definition of criteria and methods to assure control of processes, provision of resources, analysis of information and actions to implement and improve.

The research has investigated the current belief system at different levels in the organisation taking three groupings into consideration namely, top management, line management and employees. The responses were analysed with specific conclusions drawn at each level. These will be evaluated against the current performance of the organisation in achieving set targets and satisfying its customers.

6.2 THE RESEARCH PROBLEM REVISITED

The research problem which has been researched within the ambit of this dissertation reads as follows: "The influence of culture is adversely impacting on the success of QMS implementation".
The difference in the belief systems between management (top and line) and the employees on the following issues:

- The extent of performance of duties according to standard operating procedures,
- whether non-conformity control is adequate to prevent dispatch to the customer and ,
- whether corrected non conformances are prevented from recurring.

All of the above indicate a lack of understanding in the standard that management expects from employees. Procedures form the foundation for coordination of processes (their sequence and interaction), which in this case may not be clearly defined or communicated. Employees on the floor do not have access to current standard operating procedures, yet they believe that they are working according to procedure. Management argued the need to revise the company's quality policy to be specific to the scope of the organisation and resisted making plant objectives readily available to all employees. This proves that they work according to tacit knowledge, which is not documented and is subject to interpretation and how it is transferred, hence the difference to the views of management.

Employees believe in adequacy of control of non conforming products while they do not record quality characteristics as proof of conformance to requirements. When non conformities are identified products are still not scrapped in the system resulting in the possibility of being shipped to the customer. Table 6.1 and Figure 6.1 reflect an analysis of non conforming products returned by customers due to poor quality.

Table 6.1: Summary of Customer Returns (Jan – July) **Source:** Hulamin, 2009: Internal working document.

	Invoiced (kg)	**Target Returns (kg)**	**Actual Returns (kg)**	**%Target**	**% Actual**
Jan	114 000	1140	2461	1	2.2
Feb	200 900	2009	2923	1	1.4
Mar	212 523	2125	**9941**	1	**4.7**
Apr	198 983	1989	4253	1	2.1
May	181 742	1817	**5061**	1	**2.8**
Jun	159 350	1594	**7570**	1	**4.8**
Jul	161 560	1616	**8666**	1	**5.4**
		12290	**40875**	7	**23.4**

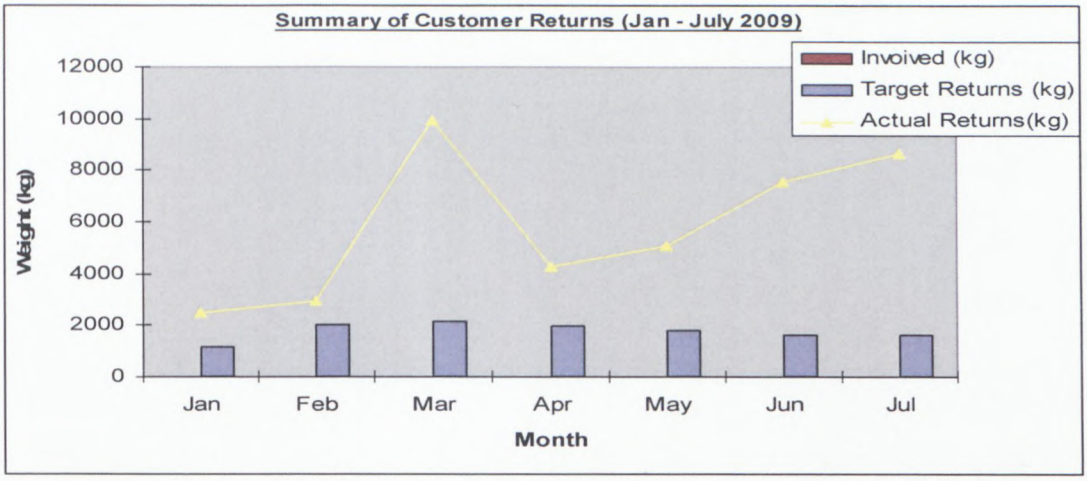

Figure 6.1: Summary of customer returns (Jan – July 2009) **Source:** Hulamin, 2009. Internal working document.

The analysis above shows that control of non conforming products is not efficient in preventing the supply of defective material to customers. It justifies management's belief that control of non conformities is not adequate. In relation to quality requirements, the resources that management should provide are those that will result in fulfillment of quality characteristics. Employee convictions are not tied to that of management and organisational target pertaining customers not satisfied with product quality. To realise the value of implementing quality practices, the culture of employees in supporting the implementation needs to change. Below are Table 6.2 and Figure 6.2 showing an analysis of the extent of recurrence of non conformances.

Table 6.2: Summary of Customer Returns per defect (Jan - July 2009) **Source:** Hulamin, 2009. Internal working document.

DEFECT	Jan	Feb	Mar	Apr	May	Jun	Jul	SUM
P/coat & Blisters	807	849	3393	0	0	823	4530	10 402
Poor Anodising	0	0	0	0	542	636	1409	2 587
Scratches & Dents	1125	107	802	2138	1928	603	1338	8 041
Dimensions	0	1412	1852	1653	856	3438	370	9 581
Incorrect die	0	93	311	0	0	0	310	714
Die lines	0	0	1116	462	281	0	219	2 078
Transit damage	16	0	0	0	890	1766	0	2 672
Twist	213	198	149	0	564	0	0	1 124
Water stains	70	0	1326	0	0	0	82	1 478
Straightness	0	0	0	0	0	0	15	15
Incorrect length	0	264	0	0	0	0	0	264
Short shipment	0	0	193	0	0	0	10	193
Incorrect price	230	0	0	0	0	0	0	230
Invoiced early	0	0	0	0	0	304	196	500
Invoice duplicated	0	0	0	0	0	0	187	187
No OPD	0	0	799	0	0	0	0	799

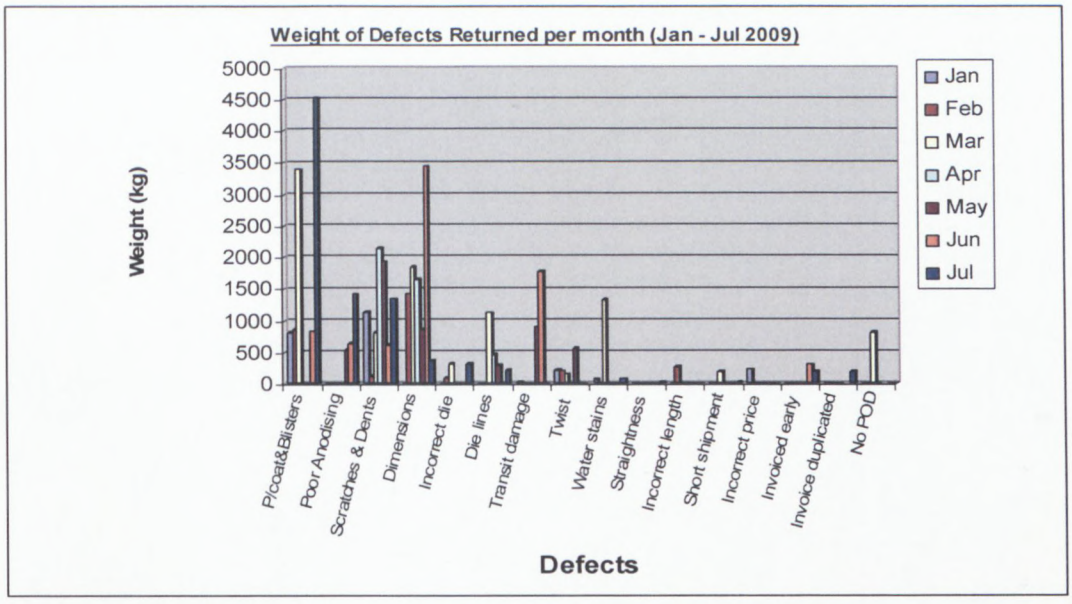

Figure 6.2 Weight of defects returned per month (Jan – Jul 2009). **Source:** Hulamin, 2009. Internal working document.

The analysis above indicates the extent to which quality defects due to powder coating and blisters, poor anodising, scratches and dents and dimensions are returned by customers in large volumes. The recurrence is evidence that the organisation needs to facilitate a culture change to achieve the planned goals as well as continuous improvement of processes to meet customer requirements. This is confirmed by about half of the employees being dissatisfied with their training they have received. According to ISO 9001, the requirements include adequate measurement of quality characteristics, training and communication.

6.3 THE RESEARCH QUESTION REVISITED

The research question to be researched within the ambit of the dissertation, reads as follows: "What mechanisms can be introduced to facilitate the implementation of a QMS in an organisation impacted upon by organisational culture?"

The latest revisions of standard operating procedures need to be finalised and approved by management. These procedures must be readily available to employees at their work stations, and they must be adequately trained on them.

Employees need to be informed of what and how critical characteristics are to be measured, monitored and recorded as proof of conformance to ensure customer requirements are met consistently. They must be trained in order to understand the importance of measuring and recording actual measurements, and the value it adds in facilitating continuous improvement. Preventive actions are required to eliminate recurrences. Furthermore, they should be implemented and continuously evaluated for effectiveness.

6.4 THE INVESTIGATIVE QUESTION REVISITED

The investigative questions to be researched in support of a research questions reads as follows:

- Does top management understand the extent to which policies and procedures may be required to change in order to comply with the requirements of the QMS?
- Is top management aware of the extent to which they may need to improve on the current infrastructure to establish process conformance to the QMS, and therefore customer requirements?
- Are the employees aware of their role in taking ownership of the system to facilitate implementation of the required changes?
- Are employees aware that their tasks may need to be changed or revised in order to establish proof of process and product conformity to customer requirements?

Top management is not aware that employees believe that they are working according to procedure; hence there is a difference in opinion about the extent to which tasks are executed. The extent to which revision of procedures is done should be elaborative, to ensure that employees are at the same level of understanding as management.

In the event that employees believe that they have adequate resources, the environment in which these resources are used may not be adequate to achieve the desired outcome. This would be applicable to the state of the run out rollers, belts for transfer of profiles and the workflow which would result in the high quantity

of scratches. The extent to which measuring of dimensions and surface quality needs to be done in order to identify and isolate defects would require employees to implement control and preventive measures adequately, with management providing a suitable environment to execute this. Considering that organisational target for non conformance reports from customers are not met while employees believe that control of non conformities is adequate. This serves as an indication that employees are not aware how their roles affect quality.

To a certain extent, the measurements and records that are currently kept may not be at the correct stage or intervals which means they are inadequate. This means the roles of employees or the stage at which they perform their tasks may need to change in order to facilitate improvement. This is something they are not aware of, because they believe that they perform their tasks adequately.

6.5 THE KEY RESEARCH OBJECTIVE REVISITED

The primary research objectives of this dissertation are the following:

- To identify the impact of culture on the implementation process of a QMS.
- To assess the challenges of organisational culture when implementing a QMS.
- To establish the need for change management when implementing a QMS.
- To make recommendations to mitigate the research problem.

In assessing the behaviour of individuals in the target organisation in terms of quality requirements, employees know what the requirements are to satisfy customer demands, however the number of non conforming products indicate that employees do not fulfill them. This reflects the current organisational culture that exists in terms of perceptions on quality.

This culture becomes a constraint to the implementation of ISO 9001 as the QMS requires evidence for fulfillment of customer requirements and prevention of non conformances. Management needs to establish how to change the current culture towards an ideal culture. The challenge is to get employees not to only agree that record keeping is essential, but to actually comply with this requirement.

Failure to achieve organisational targets results from inconsistency in different levels of the organisation. Consistency is a powerful source of stability and internal integration that culminates from a common mindset and a high degree of conformity. This presents a problem or opportunity that requires change and employees have much to contribute in terms of what it requires and to gain their commitment.

The aim is to overcome potential resistance to and develop a positive attitude in order to achieve the necessary change to embrace quality. There is a need to shift in 'how things are done' which may imply adjusting structure or responsibilities to facilitate the implementation of the required change. This may also promote indispensable 'culture building' among organisation members, resulting from adding up the behaviors of all members.

6.6 RECOMMENDATIONS

The following recommendations would in view of this researcher, mitigate the research problem:

- Die related defects namely, dimensions, die lines and twist amount to 12783, indicates the need to improve die maintenance controls and procedures for monitoring and measurement of the die preparation process. This is also the main cause for surface defects.
- Implement an analysis process for the use of sodium hydroxide as a raw material for die cleaning on regular intervals and monitor adequacy of the cleaning process.
- Implement an adequately detailed enquiry for new dies to ensure that all quality characteristics have been established between the organisation and the customer. The customer must approve pre-production samples in writing on the sample report document.
- The lot ticket is used as a work instruction to achieve customer requirements, however there is no proof that these requirements are adhered to. In this respect implement a table to record the actual measurement results as evidence of conformity to customer requirements for each lot produced.

- Identify suitable employees to carry out the required tasks for monitoring control measures, and to record of results and train them on control limits to achieve the required standards.
- Implement a product release system for team leaders, to do a final release for profiles ready for packing and shipping at adequate intervals.
- Improve handling techniques for profiles on run out tables, and maintain the quality of belts and rollers prior to ageing to ensure that profiles are adequately cooled and have minimal damage during stretching and cutting.
- Implement a data monitoring software programme to verify that each load that is hardened in the ageing furnace, reaches the required ageing temperatures to achieve the required temper which will improve resistance to damage resulting in scratches and dents during handling and in transit.
- Record daily calibration for the Webster using the set test piece to ensure that the actual temper readings measured from each lot after ageing, are accurate.
- Establish control measures and critical limits for outside processors that provide the organisation with powder coating and anodising, to ensure that the finishing quality meets customer requirements and audit them regularly.

6.7 FINAL CONCLUSION

The level of understanding of customer requirements between management and employees is an absolute requirement, to facilitate change of the current culture to the ideal culture, and not only by improving procedures and providing adequate training on test methods and the use of measuring tools. Overall understanding of the requirements of ISO 9001 and compliance to the system can facilitate overall quality improvement, the success of which is linked to a change in organisational culture.

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APPENDIX

AN OVERVIEW OF THE SOUTH AFRICAN ALUMINIUM INDUSRTY

A1 INTRODUCTION

The South African Aluminium industry is one of the industrial pillars of the South African economy. Fortunately, it has a solid foundation with a strong support of suppliers to all the industry market sectors. South Africa has its own primary aluminium smelters (currently two in Richards Bay and one to be opened at Coega). Most of the smelter output is exported, but sufficient capacity exists to supply most of South Africa's metal needs.

The Billiton smelters provide most alloys required for the automotive, building and construction, engineering and fabrication, mining, packaging, and transport industries as well as the wheel and cable industries. Where local demands cannot be met for special alloys and / or special semi-fabricated product sizes, these are then imported. BHP Billiton also manages the Mozal smelters in Mozambique and the output of the smelters makes Southern Africa a significant global player.
The automotive wheel industry and the electrical cable industry are specialist industries supplied directly by Billiton.
The other two major supply nodes of interest are:

- Secondary smelters producing casting alloys and other special metal industry alloys in ingot and powder form and
- Semi-fabricators producing extrusions, plate, sheet and foil.

In support of these producers, there are a variety of service industries required to provide material distribution, surface finishing, machining and other engineering and design services.

A2 THE SECONDARY ALUMINIUM INDUSTRY

The secondary aluminium uses scrap aluminium as its essential feed stock. In recent times the price of scrap has been forced to exceptionally high levels due to global influences. This has caused considerable financial difficulties for the secondary smelters, their customers who are mostly casters, and in turn the caster's downstream customers. These prices have rendered South African casters unable to compete globally and especially against foreign producers who are subsidized by their Governments.

Sufficient scrap tonnage is available in South Africa to meet local needs provided that the buyer pays global best prices and that the scrap export merchants can be persuaded to sell their holdings locally. On the positive side, from a metallurgical point of view, our smelters are able to produce casting and master alloys comparable and often even better than what is produced elsewhere in the world. We also have more than enough smelting capacity to meet South Africa's needs. The largest smelters are Zimalco and Metlite, with eight other smaller smelters, each with their own capabilities.

A3 THE SOUTH AFRICAN ALUMINIUM CASTING INDUSTRY

This industry has a large variation of product and process capability. Unfortunately the local market is not large enough to accommodate the newly invested capital that was required to upgrade the casting technology in South Africa. The need to expand the casting market resulted in many casters having to compete with overseas casters, which is not easy. Casting is one of the more cohesive market sectors represented through the Aluminium Casters Association (ACA) and the South African Industry of Foundrymen (SAIF).

Other than the scrap/ingot issue, a major challenge is the ability to produce large product quantities at the right price to meet the requirements of overseas buyers. South Africa is capable of producing the quality and diversity of product required based on the ability to meet applicable quality standards. A major proportion of this industry sector's output goes into the automotive industry, but cast products find a home in every industry sector from art to heavy engineering. In terms of size, the cast automotive wheel industry is by far the largest in terms of production throughput.

A4 THE SEMI-FABRICATORS

South Africa has four semi-fabricators which produce extrusions, plate, sheet and foil for the diversity of downstream fabricators and manufacturers in South Africa as well as for export. Where they are not able to supply special alloys and/or special products, these are imported either directly by the semi-fabricator, the customer themselves, or through specialist importers representing major overseas producers. All four are extruders supplying both the building and engineering downstream industries.

Hulett-Hydro Extrusions now trading as Hulamin is the largest suppler in the industry, whilst the other three namely: Wispeco Aluminium, AGI Aluminium and Lefarge Gypsum (including Macsteel Interior Systems), have their own strengths especially in the building industry. Other than Lefarge/MIS who import their billets, the other three are supplied by Billiton Bayside Aluminium.

Wispeco and Hulett-Hydro Extrusions also have their own billet casting capability using scrap as feedstock. South Africa has two rolling mill facilities being those of Hulamin with both hot and cold rolling capability. Their feedstock is alloy slabs from Bayside and from their own casting facility. Hulamin can supply most of South Africa's rolled product demand, but some alloys and product sizes must be imported. The range of locally produced alloys is steadily increasing, but there is probably always going to be a need for some imports. Hulamin also meets most industry sectors including engineering, foodstuffs and pharmaceutical packing and a variety of niche product producers.

A5 THE DOWN-STREAM VALUE-ADDING INDUSTRY SECTOR

Before discussing this sector of the industry, it is pertinent to briefly discuss aluminium and its alloys. "Aluminium" is a generic term for a group of alloys (wrought and cast) that are characterised by their chemical composition with Aluminium being the highest element in percentage. There are seven active alloy groups for wrought alloys and five for casting alloys. The behaviour in application of these alloys depends on their composition, hardness and temper categorised into heat treatable and non-heat treatable alloys.

Careful selection of the most appropriate aluminium alloy and its condition is critical to success in any application. Details of the alloys and their best application are available from the Aluminium Federation of South Africa (AFSA) and from the suppliers. AFSA is able to advise on properties, design criteria, corrosion resistance, machinability, formability, weldability and surface finishing of all common alloys.

The down stream industry is where the final value is added to the semi-fabricated products and casting alloys. This sector essentially comprises fabrication and general services over a variety of industry sectors and applications including architecture, construction, automotive, marine, commercial transport, mining, packaging (general, food and pharmaceuticals), electrical, foil applications, military, aerospace/aircraft, chemical plant, consumer durables, art and sports.

Another area where South Africa differs is in containers and packaging as South Africa uses steel beverage and beer cans as opposed to overseas where aluminium is preferred. Certainly our building industry could use much more aluminium (extrusions, cladding, roofing, gutters and the like). In terms of capital consumption, South Africa ranks well compared to other countries in similar stages of development. There is no doubt that South Africa could use more aluminium, but growth is likely to slow down due to global economic down turn.

In addition to all of the above there are essential service sectors supporting the industry and these include surface finishing, distribution / stocking and engineering services such as heat treatment, machining and forming, welding and laboratory testing. Many of these companies are members of AFSA and in particular the aluminium finishers affiliated to their own Aluminium Surface Finishers Association (ASFA), which operates under the aegis of AFSA. Surface finishing includes anodising and powder coating – for the building and engineering industries, and coil coating.

A6 THE EXPORT MARKET

The ability of the South African aluminium industry to export is well developed into niche and general industry markets. Many of the exporters have achieved internationally recognised quality standards. Current limiting factors include our inability to compete on price in certain export markets partly because of the Rand exchange rates. In some instances the inability to produce the volumes of certain products and/or components due to alloy requirements is also a challenge.

Exports will be more important as South African opportunities slow and real market volume growth depends on exports. Destocking and reduced demand in a number of important markets since October 2008 has resulted in aluminium sales volumes in the first quarter of 2009 being approximately 40% below the first quarter of 2008. The reduction in volumes and resulting changes to the sales mix has impacted negatively on the average US Dollar export margins earned in the first quarter, which were slightly below those achieved in the first quarter of 2008.

A7 ALUMUNIUM IMPORTS

Countries serving Africa via exports or supplying from Africa via imports is served from a number of competitive countries of origin. Managers could no longer rely on out-of-date statistics that appear several years after the fact. A methodology was developed, based on macroeconomic and trade models, to estimate the market for aluminium and alumina ores and concentrates.

Based on both demand and supply dynamics, market shares by country of origin are calculated across each country market destination. These shares lead to a volume of import and export values for each country and are aggregated to regional and world totals. Due to globalization of this market managers can no longer be contented with a local view.

A8 GLOBAL ECONOMIC CHALLENGES

The global alumina market showed a surplus of 1Mt in the fourth quarter of last year, mainly due to output cuts at aluminium smelters and investment in alumina refining capacity during the past few years. Chinese aluminium smelters are increasing their imports of spot alumina after overseas prices fell more than 10% recently and because of bank credits. Rising imports of alumina mean the world's top producer and consumer of the main material used for primary aluminium production could take up the surplus on international market, weighing on domestic prices. A trade manager at a large smelter said, "Some smelters are not buying alumina in the domestic market and are importing because imports are cheaper now".

"Quality of imported alumina is also better and some smelters that benefited from more credits from Chinese banks for imports were also keen to look for alumina", a trader at an international trading house said. Alumina imports rose 27% on the month in February after dropping 11% to 4.6Mt in 2008, while domestic output rose 18% to 22.8Mt. India's National Aluminium Co Ltd, a frequent seller of spot alumina on the international market, cancelled a tender for 10,000t. This occurred after it received bids with the highest at US$168.05/t which is 12% lower than a tender in late February and 14% less than another tender a few weeks earlier.

Smelter officials and traders in China said spot alumina was being offered to Chinese ports at around US$220/t, which would be below Yn1, 800 (US$263.2) after a 17% value-added tax. Buyers were asking for US$210 or below. Imported alumina already in Chinese ports traded at about Yn1, 850-Yn1, 900/t. Spot alumina was being offered by non-Chalco refineries at around Yn1,800, versus Yn1,800-Yn1,900 in mid-January and more than Yn2,600 in the fourth quarter of

last year and more than Yn4,000 in the first quarter, according to smelter officials. China has been the linchpin in the global aluminum industry with its sizable production cuts and measures to boost industrial demand. These steps have brought the global market into balance despite a rapid decline in the metal price.

A9

Descriptive statistics for each variable

Q01	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	1	2.63	1	2.63
Strongly agree	9	23.68	10	26.32
Agree	15	39.47	25	65.79
Undecided	7	18.42	32	84.21
Disagree	6	15.79	38	100.00

Chi-Square Test for Equal Proportions

Chi-Square	13.5789
DF	4
Pr > ChiSq	0.0088

Sample Size = 38

Q02	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	1	2.63	1	2.63
Displeased 5	3	7.89	4	10.53
Displeased 4	2	5.26	6	15.79
Displeased 3	3	7.89	9	23.68
Displeased 2	5	13.16	14	36.84
Displeased 1	7	18.42	21	55.26
Pleased 1	4	10.53	25	65.79
Pleased 2	5	13.16	30	78.95
Pleased 3	3	7.89	33	86.84
Pleased 4	2	5.26	35	92.11
Pleased 5	3	7.89	38	100.00

Chi-Square Test for Equal Proportions

Chi-Square	8.3158
DF	10
Pr > ChiSq	0.5980

WARNING: The table cells have expected counts less than 5. Chi-Square may not be a valid test.

Sample Size = 38

Q03	Frequency	Percent	Cumulative Frequency	Cumulative Percent
To a great extent	23	60.53	23	60.53
Some what	10	26.32	33	86.84
Very little	4	10.53	37	97.37
Not at all	1	2.63	38	100.00

Chi-Square Test for Equal Proportions

Chi-Square	30.0000
DF	3
Pr > ChiSq	<.0001

Sample Size = 38

Q04	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	1	2.63	1	2.63
Very important	27	71.05	28	73.68
Important	10	26.32	38	100.00

Chi-Square Test for Equal Proportions

Chi-Square	27.5263
DF	2
Pr > ChiSq	<.0001

Sample Size = 38

Q05	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Poor 5	2	5.26	2	5.26
Poor 4	1	2.63	3	7.89
Poor 2	1	2.63	4	10.53
Poor 1	2	5.26	6	15.79
0	3	7.89	9	23.68
Good 1	1	2.63	10	26.32

Good 2	9	23.68	19	50.00
Good 3	7	18.42	26	68.42
Good 4	6	15.79	32	84.21
Good 5	6	15.79	38	100.00

Chi-Square Test
for Equal Proportions

Chi-Square	20.4211
DF	9
Pr > ChiSq	0.0155

WARNING: The table cells have expected counts less than 5. Chi-Square may not be a valid test.

Sample Size = 38

Q06	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly agree	18	47.37	18	47.37
Agree	17	44.74	35	92.11
Undecided	3	7.89	38	100.00

Chi-Square Test
for Equal Proportions

Chi-Square	11.1053
DF	2
Pr > ChiSq	0.0039

Sample Size = 38

Q07	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Definitely	33	86.84	33	86.84
Probably	4	10.53	37	97.37
Possibly	1	2.63	38	100.00

Chi-Square Test
for Equal Proportions

Chi-Square	49.3158
DF	2
Pr > ChiSq	<.0001

Sample Size = 38

Q08	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	1	2.63	1	2.63
Very important	9	23.68	10	26.32
Important	9	23.68	19	50.00
Neutral	12	31.58	31	81.58
Unimportant	5	13.16	36	94.74
Very unimportant	2	5.26	38	100.00

Chi-Square Test
for Equal Proportions

Chi-Square	15.0526
DF	5
Pr > ChiSq	0.0101

Sample Size = 38

Q09	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	2	5.26	2	5.26
Strongly agree	3	7.89	5	13.16
Agree	3	7.89	8	21.05
Disagree	16	42.11	24	63.16
Strongly disagree	14	36.84	38	100.00

Chi-Square Test
for Equal Proportions

Chi-Square	24.3684
DF	4
Pr > ChiSq	<.0001

Sample Size = 38

Q10	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly agree	14	36.84	14	36.84
Agree	11	28.95	25	65.79
Undecided	1	2.63	26	68.42
Disagree	10	26.32	36	94.74
Strongly disagree	2	5.26	38	100.00

Chi-Square Test
for Equal Proportions

Chi-Square	17.5263
DF	4
Pr > ChiSq	0.0015

Sample Size = 38

Q11	Frequency	Percent	Cumulative Frequency	Cumulative Percent

0	1	2.63	1	2.63
To a great extent	18	47.37	19	50.00
Some what	16	42.11	35	92.11
Very little	3	7.89	38	100.00

Chi-Square Test for Equal Proportions

Chi-Square	24.1053
DF	3
Pr > ChiSq	<.0001

Sample Size = 38

Q12	Frequency	Percent	Cumulative Frequency	Cumulative Percent
To a great extent	11	28.95	11	28.95
Some what	20	52.63	31	81.58
Very little	5	13.16	36	94.74
Not at all	2	5.26	38	100.00

Chi-Square Test for Equal Proportions

Chi-Square	19.8947
DF	3
Pr > ChiSq	0.0002

Sample Size = 38

Q13	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	1	2.63	1	2.63
Mostly agree	9	23.68	10	26.32
Slightly agree	10	26.32	20	52.63
Undecided	6	15.79	26	68.42
Slightly disagree	4	10.53	30	78.95
Mostly disagree	8	21.05	38	100.00

Chi-Square Test for Equal Proportions

Chi-Square	9.0526
DF	5
Pr > ChiSq	0.1070

Sample Size = 38

Q14	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Mostly agree	17	44.74	17	44.74
Slightly agree	13	34.21	30	78.95
Undecided	7	18.42	37	97.37
Slightly disagree	1	2.63	38	100.00

Chi-Square Test for Equal Proportions

Chi-Square	15.4737
DF	3
Pr > ChiSq	0.0015

Sample Size = 38

Q15	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	1	2.63	1	2.63
Mostly agree	19	50.00	20	52.63
Slightly agree	4	10.53	24	63.16
Undecided	7	18.42	31	81.58
Slightly disagree	5	13.16	36	94.74
Mostly disagree	2	5.26	38	100.00

Chi-Square Test for Equal Proportions

Chi-Square	34.0000
DF	5
Pr > ChiSq	<.0001

Sample Size = 38

Q16	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Mostly agree	17	44.74	17	44.74
Slightly agree	9	23.68	26	68.42
Undecided	4	10.53	30	78.95
Slightly disagree	5	13.16	35	92.11
Mostly disagree	3	7.89	38	100.00

Chi-Square Test for Equal Proportions

Chi-Square	17.2632
DF	4
Pr > ChiSq	0.0017

Sample Size = 38

Q17	Frequency	Percent	Cumulative Frequency	Cumulative Percent
To a great extent	31	81.58	31	81.58
Some what	5	13.16	36	94.74
Very little	1	2.63	37	97.37
Not at all	1	2.63	38	100.00

Chi-Square Test for Equal Proportions

Chi-Square	66.0000
DF	3
Pr > ChiSq	<.0001

Sample Size = 38

Q18	Frequency	Percent	Cumulative Frequency	Cumulative Percent
To a great extent	29	76.32	29	76.32
Some what	8	21.05	37	97.37
Very little	1	2.63	38	100.00

Chi-Square Test for Equal Proportions

Chi-Square	33.5263
DF	2
Pr > ChiSq	<.0001

Sample Size = 38

Q19	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	1	2.63	1	2.63
To a great extent	22	57.89	23	60.53
Some what	11	28.95	34	89.47
Very little	3	7.89	37	97.37
Not at all	1	2.63	38	100.00

Chi-Square Test for Equal Proportions

Chi-Square	43.0526
DF	4
Pr > ChiSq	<.0001

Sample Size = 38

Q20	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Very important	34	89.47	34	89.47
Important	4	10.53	38	100.00

Chi-Square Test for Equal Proportions

Chi-Square	23.6842
DF	1
Pr > ChiSq	<.0001

Sample Size = 38

Q21	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Mostly agree	11	28.95	11	28.95
Slightly agree	12	31.58	23	60.53
Undecided	2	5.26	25	65.79
Slightly disagree	7	18.42	32	84.21
Mostly disagree	6	15.79	38	100.00

Chi-Square Test for Equal Proportions

Chi-Square	8.5789
DF	4
Pr > ChiSq	0.0725

Sample Size = 38

Q22	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Acc. Adm.	1	2.78	1	2.78
Admin	1	2.78	2	5.56
Billet hed. Operation	1	2.78	3	8.33
Die Cleaner	1	2.78	4	11.11
Die Corrector	2	5.56	6	16.67
Draughtsman	1	2.78	7	19.44
Electrician	1	2.78		

8	22.22		
Eng. Tech. Suff. Tech.		1	2.78
9	25.00		
Etc. House Operator		1	2.78
10	27.78		
Executive Operator		1	2.78
11	30.56		
Extrusion/Maintenance Supervisor		1	2.78
12	33.33		
Fitter and Tuner		1	2.78
13	36.11		
HOD Die Maintenance		1	2.78
14	38.89		
Inspector Neste		2	5.56
16	44.44		
Internal Sales		1	2.78
17	47.22		
Internet Sales		1	2.78
18	50.00		
Maintenance Fitter		1	2.78
19	52.78		
Neste		2	5.56
21	58.33		
Packing		1	2.78
22	61.11		
Packing Supervisor		1	2.78
23	63.89		
Plant Manager		1	2.78
24	66.67		
Quality Assurance		1	2.78
25	69.44		
Sales		1	2.78
26	72.22		
Sales Manager		1	2.78
27	75.00		
Sales Rep.		1	2.78
28	77.78		
She Officer		1	2.78
29	80.56		
Stores		1	2.78
30	83.33		
Stretcher Operator		2	5.56
32	88.89		
Supervisor		1	2.78
33	91.67		
Teamleader		3	8.33
36	100.00		

WARNING: The table cells have expected counts less
than 5. Chi-Square may not be a valid test.
Effective Sample Size = 36
Frequency Missing = 2

Q23	Frequency	Percent	Cumulative Frequency	Cumulative Percent
CTL Operation	1	100.00	1	100.00

Effective Sample Size = 1
Frequency Missing = 37
WARNING: 97% of the data are missing.

Q24	Frequency	Percent	Cumulative Frequency	Cumulative Percent
06MAY2009:00:00:00	1	2.86	1	2.86
07MAY2009:00:00:00	7	20.00	8	22.86
08MAY2009:00:00:00	6	17.14	14	40.00
11MAY2009:00:00:00	3	8.57	17	48.57
12MAY2009:00:00:00	3	8.57	20	57.14
11JUN2009:00:00:00	1	2.86	21	60.00
18JUN2009:00:00:00	3	8.57	24	68.57
19JUN2009:00:00:00	9	25.71	33	94.29
22JUN2009:00:00:00	2	5.71	35	100.00

WARNING: The table cells have expected counts less
than 5. Chi-Square may not be a valid test.
Effective Sample Size = 35
Frequency Missing = 3

q25	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Management	3	8.11	3	8.11
Line Management	6	16.22	9	24.32
Employees	28	75.68	37	100.00

Chi-Square Test
for Equal Proportions

Chi-Square	30.2162
DF	2
Pr > ChiSq	<.0001

Effective Sample Size = 37
Frequency Missing = 1

Variable: Q01 (Q01)

N	37	Sum Weights	37
Mean	2.27027027	Sum Observations	84
Std Deviation	1.01785855	Variance	1.03603604
Skewness	0.41848912	Kurtosis	-0.8453005
Uncorrected SS	228	Corrected SS	37.2972973
Coeff Variation	44.8342458	Std Error Mean	0.16733492

Basic Statistical Measures

Location		Variability	
Mean	2.270270	Std Deviation	1.01786
Median	2.000000	Variance	1.03604
Mode	2.000000	Range	3.00000
		Interquartile Range	1.00000

Variable: Q02 (Q02)

N	37	Sum Weights	37
Mean	5.45945946	Sum Observations	202
Std Deviation	2.54508889	Variance	6.47747748
Skewness	0.04985389	Kurtosis	-0.6479524
Uncorrected SS	1336	Corrected SS	233.189189
Coeff Variation	46.6179649	Std Error Mean	0.41841004

Basic Statistical Measures

Location		Variability	
Mean	5.459459	Std Deviation	2.54509
Median	5.000000	Variance	6.47748
Mode	5.000000	Range	9.00000
		Interquartile Range	3.00000

Variable: Q03 (Q03)

N	38	Sum Weights	38
Mean	1.55263158	Sum Observations	59
Std Deviation	0.79516677	Variance	0.63229018
Skewness	1.35049126	Kurtosis	1.19128528
Uncorrected SS	115	Corrected SS	23.3947368
Coeff Variation	51.2141307	Std Error Mean	0.12899308

Basic Statistical Measures

Location		Variability	
Mean	1.552632	Std Deviation	0.79517
Median	1.000000	Variance	0.63229
Mode	1.000000	Range	3.00000
		Interquartile Range	1.00000

Variable: Q04 (Q04)

N	37	Sum Weights	37
Mean	1.27027027	Sum Observations	47
Std Deviation	0.45022517	Variance	0.2027027
Skewness	1.07882526	Kurtosis	-0.8871709
Uncorrected SS	67	Corrected SS	7.2972973
Coeff Variation	35.443258	Std Error Mean	0.07401656

Basic Statistical Measures

Location		Variability	
Mean	1.270270	Std Deviation	0.45023
Median	1.000000	Variance	0.20270
Mode	1.000000	Range	1.00000
		Interquartile Range	1.00000

Variable: Q05 (Q05)

N	35	Sum Weights	35
Mean	2.17142857	Sum Observations	76
Std Deviation	2.72769796	Variance	7.44033613
Skewness	-1.4360234	Kurtosis	1.59845917
Uncorrected SS	418	Corrected SS	252.971429
Coeff Variation	125.617669	Std Error Mean	0.46106511

Basic Statistical Measures

Location		Variability	
Mean	2.171429	Std Deviation	2.72770
Median	3.000000	Variance	7.44034
Mode	2.000000	Range	10.00000
		Interquartile Range	2.00000

Variable: Q06 (Q06)

N	38	Sum Weights	38
Mean	1.60526316	Sum Observations	61
Std Deviation	0.63838791	Variance	0.40753912
Skewness	0.56953378	Kurtosis	-0.545319
Uncorrected SS	113	Corrected SS	15.0789474
Coeff Variation	39.7684269	Std Error Mean	0.10356019

Basic Statistical Measures

Location		Variability	
Mean	1.605263	Std Deviation	0.63839
Median	2.000000	Variance	0.40754
Mode	1.000000	Range	2.00000
		Interquartile Range	1.00000

Variable: Q07 (Q07)

N	38	Sum Weights	38
Mean	1.15789474	Sum Observations	44
Std Deviation	0.43659096	Variance	0.19061166
Skewness	2.91721993	Kurtosis	8.59314197
Uncorrected SS	58	Corrected SS	7.05263158
Coeff Variation	37.7055827	Std Error Mean	0.07082441

Basic Statistical Measures

Location		Variability	
Mean	1.157895	Std Deviation	0.43659
Median	1.000000	Variance	0.19061
Mode	1.000000	Range	2.00000
		Interquartile Range	0

Variable: Q08 (Q08)

N	37	Sum Weights	37
Mean	2.51351351	Sum Observations	93
Std Deviation	1.16955883	Variance	1.36786787
Skewness	0.29604694	Kurtosis	-0.6468752
Uncorrected SS	283	Corrected SS	49.2432432
Coeff Variation	46.5308354	Std Error Mean	0.19227429

Basic Statistical Measures

Location		Variability	
Mean	2.513514	Std Deviation	1.16956
Median	3.000000	Variance	1.36787
Mode	3.000000	Range	4.00000
		Interquartile Range	1.00000

Variable: Q09 (Q09)

N	36	Sum Weights	36
Mean	3.97222222	Sum Observations	143
Std Deviation	1.23024065	Variance	1.51349206
Skewness	-1.4067838	Kurtosis	1.09481147
Uncorrected SS	621	Corrected SS	52.9722222
Coeff Variation	30.9710934	Std Error Mean	0.20504011

Basic Statistical Measures

Location		Variability	
Mean	3.972222	Std Deviation	1.23024
Median	4.000000	Variance	1.51349
Mode	4.000000	Range	4.00000
		Interquartile Range	1.00000

Variable: Q10 (Q10)

N	38	Sum Weights	38
Mean	2.34210526	Sum Observations	89
Std Deviation	1.36116635	Variance	1.85277383
Skewness	0.55567489	Kurtosis	-1.2118455
Uncorrected SS	277	Corrected SS	68.5526316
Coeff Variation	58.1172149	Std Error Mean	0.22081034

Basic Statistical Measures

Location		Variability	
Mean	2.342105	Std Deviation	1.36117
Median	2.000000	Variance	1.85277
Mode	1.000000	Range	4.00000
		Interquartile Range	3.00000

Variable: Q11 (Q11)

N	37	Sum Weights	37
Mean	1.59459459	Sum Observations	59
Std Deviation	0.64375027	Variance	0.41441441
Skewness	0.61749959	Kurtosis	-0.5180505
Uncorrected SS	109	Corrected SS	14.9189189
Coeff Variation	40.3707799	Std Error Mean	0.10583189

Basic Statistical Measures

Location		Variability	
Mean	1.594595	Std Deviation	0.64375
Median	2.000000	Variance	0.41441
Mode	1.000000	Range	2.00000
		Interquartile Range	1.00000

Variable: Q12 (Q12)

N	38	Sum Weights	38
Mean	1.94736842	Sum Observations	74
Std Deviation	0.80361913	Variance	0.6458037
Skewness	0.75740324	Kurtosis	0.58988882
Uncorrected SS	168	Corrected SS	23.8947368
Coeff Variation	41.2669281	Std Error Mean	0.13036424

Basic Statistical Measures

Location		Variability	
Mean	1.947368	Std Deviation	0.80362
Median	2.000000	Variance	0.64580
Mode	2.000000	Range	3.00000
		Interquartile Range	1.00000

Variable: Q13 (Q13)

N	37	Sum Weights	37
Mean	2.78378378	Sum Observations	103
Std Deviation	1.49322796	Variance	2.22972973
Skewness	0.33903908	Kurtosis	-1.3089423
Uncorrected SS	367	Corrected SS	80.2702703
Coeff Variation	53.6402276	Std Error Mean	0.24548516

Basic Statistical Measures

Location		Variability	
Mean	2.783784	Std Deviation	1.49323
Median	2.000000	Variance	2.22973
Mode	2.000000	Range	4.00000
		Interquartile Range	2.00000

Variable: Q14 (Q14)

N	38	Sum Weights	38
Mean	1.78947368	Sum Observations	68
Std Deviation	0.84334901	Variance	0.71123755
Skewness	0.71223972	Kurtosis	-0.3978578
Uncorrected SS	148	Corrected SS	26.3157895
Coeff Variation	47.1283271	Std Error Mean	0.13680927

Basic Statistical Measures

Location		Variability	
Mean	1.789474	Std Deviation	0.84335
Median	2.000000	Variance	0.71124
Mode	1.000000	Range	3.00000
		Interquartile Range	1.00000

Variable: Q15 (Q15)

N	37	Sum Weights	37

Mean	2.10810811	Sum Observations	78
Std Deviation	1.32882119	Variance	1.76576577
Skewness	0.76763054	Kurtosis	-0.7723884
Uncorrected SS	228	Corrected SS	63.5675676
Coeff Variation	63.0338259	Std Error Mean	0.21845686

Basic Statistical Measures

Location		Variability	
Mean	2.108108	Std Deviation	1.32882
Median	1.000000	Variance	1.76577
Mode	1.000000	Range	4.00000
		Interquartile Range	2.00000

Variable: Q16 (Q16)

N	38	Sum Weights	38
Mean	2.15789474	Sum Observations	82
Std Deviation	1.34619214	Variance	1.81223329
Skewness	0.88977061	Kurtosis	-0.4922811
Uncorrected SS	244	Corrected SS	67.0526316
Coeff Variation	62.3845139	Std Error Mean	0.2183812

Basic Statistical Measures

Location		Variability	
Mean	2.157895	Std Deviation	1.34619
Median	2.000000	Variance	1.81223
Mode	1.000000	Range	4.00000
		Interquartile Range	2.00000

Variable: Q17 (Q17)

N	38	Sum Weights	38
Mean	1.26315789	Sum Observations	48
Std Deviation	0.64448641	Variance	0.41536273
Skewness	2.89600887	Kurtosis	9.0537736
Uncorrected SS	76	Corrected SS	15.3684211
Coeff Variation	51.0218407	Std Error Mean	0.1045495

Basic Statistical Measures

Location		Variability	
Mean	1.263158	Std Deviation	0.64449
Median	1.000000	Variance	0.41536
Mode	1.000000	Range	3.00000
		Interquartile Range	0

Variable: Q18 (Q18)

N	38	Sum Weights	38
Mean	1.26315789	Sum Observations	48
Std Deviation	0.50319039	Variance	0.25320057
Skewness	1.77146819	Kurtosis	2.49095653
Uncorrected SS	70	Corrected SS	9.36842105
Coeff Variation	39.8359059	Std Error Mean	0.08162826

Basic Statistical Measures

Location		Variability	
Mean	1.263158	Std Deviation	0.50319
Median	1.000000	Variance	0.25320
Mode	1.000000	Range	2.00000
		Interquartile Range	0

Variable: Q19 (Q19)

N	37	Sum Weights	37
Mean	1.54054054	Sum Observations	57
Std Deviation	0.76719527	Variance	0.58858859
Skewness	1.41735841	Kurtosis	1.71292166
Uncorrected SS	109	Corrected SS	21.1891892
Coeff Variation	49.800395	Std Error Mean	0.12612613

Basic Statistical Measures

Location		Variability	
Mean	1.540541	Std Deviation	0.76720
Median	1.000000	Variance	0.58859
Mode	1.000000	Range	3.00000
		Interquartile Range	1.00000

Variable: Q20 (Q20)

N	38	Sum Weights	38
Mean	1.10526316	Sum Observations	42
Std Deviation	0.31101175	Variance	0.09672831
Skewness	2.67942719	Kurtosis	5.4644958
Uncorrected SS	50	Corrected SS	3.57894737
Coeff Variation	28.1391581	Std Error Mean	0.05045277

Basic Statistical Measures

Location		Variability	
Mean	1.105263	Std Deviation	0.31101
Median	1.000000	Variance	0.09673
Mode	1.000000	Range	1.00000
		Interquartile Range	0

Variable: Q21 (Q21)

N	38	Sum Weights	38
Mean	2.60526316	Sum Observations	99
Std Deviation	1.48031176	Variance	2.1913229
Skewness	0.46921176	Kurtosis	-1.2833234
Uncorrected SS	339	Corrected SS	81.0789474
Coeff Variation	56.8200473	Std Error Mean	0.24013828

Basic Statistical Measures

Location		Variability	
Mean	2.605263	Std Deviation	1.48031
Median	2.000000	Variance	2.19132
Mode	2.000000	Range	4.00000
		Interquartile Range	3.00000

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum	Label
Q01	29	2.31034	1.00369	67.00000	1.00000	4.00000	Q01
Q02	29	5.48276	2.66754	159.00000	1.00000	10.00000	Q02
Q03	29	1.58621	0.82450	46.00000	1.00000	4.00000	Q03
Q04	29	1.31034	0.47082	38.00000	1.00000	2.00000	Q04
Q05	29	2.00000	2.92770	58.00000	-5.00000	5.00000	Q05
Q06	29	1.65517	0.66953	48.00000	1.00000	3.00000	Q06
Q07	29	1.17241	0.46820	34.00000	1.00000	3.00000	Q07
Q08	29	2.44828	1.21262	71.00000	1.00000	5.00000	Q08
Q09	29	3.86207	1.32891	112.00000	1.00000	5.00000	Q09
Q10	29	2.20690	1.37267	64.00000	1.00000	5.00000	Q10
Q11	29	1.62069	0.67685	47.00000	1.00000	3.00000	Q11
Q12	29	2.10345	0.81700	61.00000	1.00000	4.00000	Q12
Q13	29	2.93103	1.55681	85.00000	1.00000	5.00000	Q13
Q14	29	1.86207	0.83342	54.00000	1.00000	4.00000	Q14
Q15	29	2.13793	1.32891	62.00000	1.00000	5.00000	Q15
Q16	29	2.06897	1.19317	60.00000	1.00000	5.00000	Q16
Q17	29	1.31034	0.71231	38.00000	1.00000	4.00000	Q17
Q18	29	1.31034	0.54139	38.00000	1.00000	3.00000	Q18
Q19	29	1.48276	0.73779	43.00000	1.00000	4.00000	Q19
Q20	29	1.10345	0.30993	32.00000	1.00000	2.00000	Q20
Q21	29	2.75862	1.52726	80.00000	1.00000	5.00000	Q21

Cronbach Coefficient Alpha

Variables	Alpha
Raw	0.014161
Standardized	0.428216

Cronbach Coefficient Alpha with Deleted Variable

Deleted Variable	Raw Variables: Correlation with Total	Raw Variables: Alpha	Standardized Variables: Correlation with Total	Standardized Variables: Alpha	Label
Q01	-.064666	0.037450	0.061161	0.428884	Q01
Q02	-.234866	0.235733	-.459821	0.530242	Q02
Q03	0.125218	-.022729	0.299381	0.376180	Q03
Q04	0.146608	-.010283	0.239277	0.389877	Q04
Q05	0.004753	0.013185	-.127199	0.467652	Q05
Q06	0.098003	-.009037	0.422038	0.347370	Q06
Q07	0.146968	-.010206	0.236471	0.390509	Q07
Q08	0.259745	-.104274	0.135554	0.412876	Q08
Q09	0.222807	-.097145	0.183405	0.402365	Q09
Q10	-.000467	0.015234	0.044244	0.432468	Q10
Q11	0.110262	-.012295	0.293919	0.377436	Q11
Q12	-.145081	0.055596	0.043837	0.432554	Q12
Q13	0.118553	-.053975	0.098142	0.420976	Q13
Q14	0.152750	-.031592	0.253504	0.386659	Q14
Q15	0.239442	-.105976	0.398168	0.353068	Q15
Q16	0.077020	-.018615	0.250047	0.387442	Q16
Q17	-.254106	0.076402	0.044481	0.432418	Q17
Q18	0.185205	-.021600	0.171537	0.404987	Q18
Q19	-.076537	0.034186	-.153264	0.472822	Q19
Q20	0.199632	-.007723	0.367006	0.360440	Q20
Q21	-.397918	0.213435	-.127481	0.467708	Q21

Cronbach Coefficient Alpha

Variables	Alpha
Raw	0.716416
Standardized	0.728155

Cronbach Coefficient Alpha with Deleted Variable

Deleted Variable	Raw Variables: Correlation with Total	Raw Variables: Alpha	Standardized Variables: Correlation with Total	Standardized Variables: Alpha	Label
Q03	0.494479	0.677495	0.488043	0.688756	Q03
Q04	0.298030	0.710839	0.307117	0.720660	Q04
Q06	0.245317	0.713557	0.279249	0.725378	Q06
Q08	0.368847	0.697844	0.344922	0.714177	Q08
Q09	0.286016	0.718539	0.278346	0.725530	Q09
Q11	0.377120	0.698486	0.399046	0.704728	Q11
Q14	0.471576	0.680281	0.449419	0.695755	Q14
Q15	0.582155	0.647585	0.579867	0.671698	Q15
Q16	0.518166	0.665046	0.511046	0.684539	Q16

Wilcoxon Scores (Rank Sums) for Variable Q01

q25	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Employees	27	479.50	499.50	26.173050	17.759259
Line Management	6	137.00	111.00	22.526175	22.833333
Management	3	49.50	55.50	16.705859	16.500000

Average scores were used for ties.

Kruskal-Wallis Test

Chi-Square	1.3744
DF	2
Pr > Chi-Square	0.5030

Wilcoxon Scores (Rank Sums) for Variable Q02

q25	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score

q25	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Employees	27	553.0	499.50	27.163789	20.481481
Line Management	6	68.0	111.00	23.378867	11.333333
Management	3	45.0	55.50	17.338232	15.000000

Average scores were used for ties.

Kruskal-Wallis Test

Chi-Square	4.1250
DF	2
Pr > Chi-Square	0.1271

Wilcoxon Scores (Rank Sums) for Variable Q03

q25	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Employees	28	418.50	532.0	24.289637	14.946429
Line Management	6	192.00	114.0	20.867827	32.000000
Management	3	92.50	57.0	15.453286	30.833333

Average scores were used for ties.

Kruskal-Wallis Test

Chi-Square	21.8662
DF	2
Pr > Chi-Square	<.0001

Wilcoxon Scores (Rank Sums) for Variable Q04

q25	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Employees	27	468.0	499.50	20.537248	17.333333
Line Management	6	138.0	111.00	17.675649	23.000000
Management	3	60.0	55.50	13.108612	20.000000

Average scores were used for ties.

Kruskal-Wallis Test

Chi-Square	2.6406
DF	2
Pr > Chi-Square	0.2671

Wilcoxon Scores (Rank Sums) for Variable Q05

q25	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Employees	27	492.0	472.50	23.095333	18.222222
Line Management	5	52.0	87.50	20.229135	10.400000
Management	2	51.0	35.00	13.439506	25.500000

Average scores were used for ties.

Kruskal-Wallis Test

Chi-Square	4.1075
DF	2
Pr > Chi-Square	0.1283

Wilcoxon Scores (Rank Sums) for Variable Q06

q25	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Employees	28	506.00	532.0	25.330518	18.071429
Line Management	6	134.50	114.0	21.762073	22.416667
Management	3	62.50	57.0	16.115504	20.833333

Average scores were used for ties.

Kruskal-Wallis Test

Chi-Square	1.1068
DF	2
Pr > Chi-Square	0.5750

Wilcoxon Scores (Rank Sums) for Variable Q07

q25	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Employees	28	534.00	532.0	16.761442	19.071429
Line Management	6	119.50	114.0	14.400169	19.916667
Management	3	49.50	57.0	10.663781	16.500000

Average scores were used for ties.

Kruskal-Wallis Test

Chi-Square	0.5802
DF	2
Pr > Chi-Square	0.7482

Wilcoxon Scores (Rank Sums) for Variable Q08

q25	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Employees	27	444.50	499.50	26.511655	16.462963
Line Management	6	130.00	111.00	22.817600	21.666667
Management	3	91.50	55.50	16.921985	30.500000

Average scores were used for ties.

Kruskal-Wallis Test

Chi-Square	5.8025
DF	2
Pr > Chi-Square	0.0550

Wilcoxon Scores (Rank Sums) for Variable Q09

q25	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score

Employees	26	446.00	468.0	24.523852	17.153846
Line Management	6	98.50	108.0	21.147322	16.416667
Management	3	85.50	54.0	15.707837	28.500000

Average scores were used for ties.

Kruskal-Wallis Test

Chi-Square	4.0510
DF	2
Pr > Chi-Square	0.1319

Wilcoxon Scores (Rank Sums) for Variable Q10

q25	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Employees	28	516.0	532.0	26.883130	18.428571
Line Management	6	146.0	114.0	23.095961	24.333333
Management	3	41.0	57.0	17.103290	13.666667

Average scores were used for ties.

Kruskal-Wallis Test

Chi-Square	2.4987
DF	2
Pr > Chi-Square	0.2867

Wilcoxon Scores (Rank Sums) for Variable Q11

q25	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Employees	27	465.0	499.50	24.523968	17.222222
Line Management	6	123.0	111.00	21.106871	20.500000
Management	3	78.0	55.50	15.653274	26.000000

Average scores were used for ties.

Kruskal-Wallis Test

Chi-Square	2.6581
DF	2
Pr > Chi-Square	0.2647

Wilcoxon Scores (Rank Sums) for Variable Q12

q25	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Employees	28	481.00	532.0	25.585046	17.178571
Line Management	6	160.50	114.0	21.980745	26.750000
Management	3	61.50	57.0	16.277437	20.500000

Average scores were used for ties.

Kruskal-Wallis Test

Chi-Square	4.7863
DF	2
Pr > Chi-Square	0.0913

Wilcoxon Scores (Rank Sums) for Variable Q13

q25	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Employees	27	508.0	499.50	26.714563	18.814815
Line Management	6	101.0	111.00	22.992235	16.833333
Management	3	57.0	55.50	17.051498	19.000000

Average scores were used for ties.

Kruskal-Wallis Test

Chi-Square	0.1900
DF	2
Pr > Chi-Square	0.9094

Wilcoxon Scores (Rank Sums) for Variable Q14

q25	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Employees	28	506.50	532.0	26.238511	18.089286
Line Management	6	116.50	114.0	22.542153	19.416667
Management	3	80.00	57.0	16.693177	26.666667

Average scores were used for ties.

Kruskal-Wallis Test

Chi-Square	1.9845
DF	2
Pr > Chi-Square	0.3707

Wilcoxon Scores (Rank Sums) for Variable Q15

q25	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Employees	27	433.00	499.50	25.120282	16.037037
Line Management	6	151.50	111.00	21.620096	25.250000
Management	3	81.50	55.50	16.033893	27.166667

Average scores were used for ties.

Kruskal-Wallis Test

Chi-Square	7.0866
DF	2
Pr > Chi-Square	0.0289

Wilcoxon Scores (Rank Sums) for Variable Q16

q25	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Employees	28	453.0	532.0	26.593029	16.178571

Line Management	6	167.0	114.0	22.846728	27.833333
Management	3	83.0	57.0	16.918725	27.666667

Average scores were used for ties.

Kruskal-Wallis Test

Chi-Square	8.8256
DF	2
Pr > Chi-Square	0.0121

Wilcoxon Scores (Rank Sums) for Variable Q17

q25	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Employees	28	528.50	532.0	19.258905	18.875000
Line Management	6	110.50	114.0	16.545800	18.416667
Management	3	64.00	57.0	12.252689	21.333333

Average scores were used for ties.

Kruskal-Wallis Test

Chi-Square	0.3454
DF	2
Pr > Chi-Square	0.8414

Wilcoxon Scores (Rank Sums) for Variable Q18

q25	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Employees	28	536.50	532.0	21.080925	19.160714
Line Management	6	105.00	114.0	18.111143	17.500000
Management	3	61.50	57.0	13.411875	20.500000

Average scores were used for ties.

Kruskal-Wallis Test

Chi-Square	0.3214
DF	2
Pr > Chi-Square	0.8515

Wilcoxon Scores (Rank Sums) for Variable Q19

q25	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Employees	27	512.0	499.50	24.065536	18.962963
Line Management	6	105.0	111.00	20.712315	17.500000
Management	3	49.0	55.50	15.360664	16.333333

Average scores were used for ties.

Kruskal-Wallis Test

Chi-Square	0.3015
DF	2
Pr > Chi-Square	0.8601

Wilcoxon Scores (Rank Sums) for Variable Q20

q25	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Employees	28	531.50	532.0	15.198684	18.982143
Line Management	6	120.50	114.0	13.057565	20.083333
Management	3	51.00	57.0	9.669540	17.000000

Average scores were used for ties.

Kruskal-Wallis Test

Chi-Square	0.5617
DF	2
Pr > Chi-Square	0.7551

Wilcoxon Scores (Rank Sums) for Variable Q21
Classified by Variable q25

q25	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
Employees	28	546.50	532.0	27.324625	19.517857
Line Management	6	111.00	114.0	23.475260	18.500000
Management	3	45.50	57.0	17.384173	15.166667

Average scores were used for ties.

Kruskal-Wallis Test

Chi-Square	0.4843
DF	2
Pr > Chi-Square	0.7849