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The Effectiveness of the ISO 9001:2000 Quality Management Standard on Performance and Customer Satisfaction at a Selected Organisation

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ABSTRACT

Over the years, organisations have been criticised for implementing the ISO 9000 Quality Management Standards purely as a marketing strategy without any commitment to improving quality and customer satisfaction. This study aimed to investigate the effectiveness of the ISO 9001:2000 quality management standard on performance and customer satisfaction. The objectives of the study included determining the level of effectiveness of the ISO 9001:2000 quality management with respect to enhanced leadership, continuous improvement and customer satisfaction; ascertaining the extent to which ISO 9004 and other business improvement approaches that were used to improve the performance of the organisation and determining the level of customer complaints before and after ISO 9001:2000 certification. This research investigation involved the case study approach which utilised both the qualitative and quantitative methodologies. The latter involved the analysis of the organisation's production and customer complaints data pre- and post ISO 9001:2000 certification as well as the responses to the closed-ended questions in the questionnaire, while the former entailed an analysis of the responses to the open-ended questions in the questionnaire and a search of the literature to corroborate the findings of this study. Thirty-one of the fifty-two employees of the organisation completed and returned the questionnaire that was administered. This represented a 60% response rate. The responses to the questionnaire were influenced by the employees' level of training, knowledge and experience of the ISO 9001 quality management standard. Thus, the results cannot be generalised to other ISO 9001 certified organisations. The pre- and post study revealed that the level of customer complaints decreased following ISO 9001:2000 certification. Analysis of the responses to the questionnaire indicated that the ISO 9001:2000 quality management standard was, in most instances, perceived to be effective in ensuring customer satisfaction, leadership and continuous improvement. For future research, it is recommended that researchers investigate the impact of continuous improvement teams and the introduction of appropriate business improvement approaches on organisational performance and customer satisfaction in ISO 9001 certified organisations.

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DECLARATION BY CANDIDATE

I, Rajendran Moodaliyar, declare that unless otherwise indicated, this dissertation is my own work and that it has not been submitted for any degree at another Tertiary Institution.

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LIST OF ACRONYMS

BEM	Business Excellence Model
BPR	Business Process Re-engineering
DMAIC	Define, Measure, Analyse, Improve and Control
ISO	International Organisation for Standardisation
PDCA	Plan-Do-Check-Act cycle
QFD	Quality Function Deployment
QMS	Quality Management System
TQM	Total Quality Management

GLOSSARY OF TERMS

Business excellence model	model based on the concept that an organisation will achieve better results by involving all the employees in the organisation in the continuous improvement of their processes.
Business process re-engineering	is the total restructuring of an organisation which entails a radical redesign of business processes to achieve formidable improvements in organisational performance.
Certification	obtained when the quality system has been assessed by a competent, registered authority as conforming to the requirement of the relevant ISO 9000 standard.
Continuous improvement	process of ongoing improvements that are introduced to add value to an organisation's processes.
ISO 9000	sets out the fundamental terms and definitions used in this family of standards.

ISO 9001	stipulates the requirements used to assess the organisation's ability to meet customer and applicable regulatory requirements in order to achieve customer satisfaction.
ISO 9004	provides detailed guidance to an organisation for the continual improvement of its quality management system in order to achieve and maintain customer satisfaction.
Lean manufacturing	an approach for reducing waste in production processes using just-in-time concepts.
Quality management system	management system to direct and control an organisation with respect to quality.
Quality policy	overall intentions and direction of an organisation related to quality as formally declared by top management.
Quality function deployment	involves developing a matrix that includes customer preferences and product properties which allows an analysis of the relationship between customer needs and design properties.

Six sigma	the use of statistical analysis and computer simulation for the definition, measurement and reduction of defects and waste.
Supply chain	a network of facilities that procures the required materials, transforms them into final products, and then delivers the products to customers through a distribution system.
Total quality management	an approach which is committed to total customer satisfaction through a continuous process of improvement, and the contribution and involvement of employees.

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OVERVIEW OF THE STUDY

1.1 INTRODUCTION

The International Organisation for Standardisation (ISO), based in Geneva, is the world's largest developer and publisher of standards and is a network of the national standards institutes of 157 countries (http://www.iso.org, 23-07-08). ISO 9001 is one such standard and according to Foster (2007:92), this standard was developed so that an international standard for documentation of quality systems could be implemented in organisations around the world. This is reinforced by Jacobs and Chase (2008:144) who are of the belief that the purpose of ISO is to facilitate international trade through the provision of a single set of standards that will be recognised and respected by people everywhere.

Russell and Taylor (2006:116) refer to standards as documented agreements that include technical specifications to be used consistently as rules, guidelines, or definitions to ensure that materials, products, processes or services are fit for their purpose. In addition to providing a safeguard for users of products and services, the International Organisation for Standardisation develops voluntary technical standards that contribute to making development, manufacturing, and supply of products and services more efficient, safer, and environmentally friendly (SABS Register 2000, 1999:20).

In order to obtain ISO 9001 certification, an organisation has to furnish thorough documentation of its quality processes. This includes methods used to check quality, methods and extent of worker training, work instructions, inspection programmes and statistical process-control tools used (Reid and Sanders, 2005:161). Certification is obtained when the quality system has been assessed by a competent, registered authority as conforming to the requirement of the ISO 9001 standard (Krajewski and Ritzman, 2005:225). According to Goetsch and Davis (2002:9), the rationale for obtaining ISO 9001 certification should include improving quality and consistency of

a product or service; enhancing organisational performance and having an internationally recognised quality management system.

1.2 PROBLEM STATEMENT

In a study carried out on Hong Kong constructors, Dissanayaka, Kumaraswamy, Karim and Marosszeky (2001:37) found that the primary motive behind the implementation of ISO 9001 certified quality systems was to qualify for public works tender lists. This finding is reinforced by Seddon (2004:34), who claims that without marketplace coercion, ISO 9001 would have faded away. Furthermore, Jacobs (2004:23), contends that organisations were wasting time and money if they introduced ISO 9001 because they were forced to do so by a demanding customer to secure more business or because they hoped that it will improve their performance.

Joubert (1998:63) highlights that some organisations regretted that they did not get the expected benefits following ISO certification because the quality of their products had not improved. Furthermore, it is suggested that the benefits of ISO certification depends heavily on the real motive of the organisation to achieve this end. Thus, if the organisation is more interested in improving its marketing image rather than its long term quality strategy, it will not gain all the potential benefits of ISO certification.

The ISO 9001 quality management standard has drawn criticism that it was not customer focused and that organisations were achieving certification purely as a marketing strategy without commitment to improving quality.

1.3 AIM OF THE STUDY

The researcher aims to investigate the extent to which the ISO 9001 quality management standard affects performance and ultimately customer satisfaction in the long term. The study will focus on the year 2000 version of this quality management standard.

1.4 OBJECTIVES OF THE STUDY

- to determine the main problem areas affecting customer satisfaction and performance;

- to establish whether marketing was a motive for obtaining ISO 9001:2000 certification (H1 - there is a significant relationship between ISO 9001 certification and marketing as one of the motives for implementation);

- to determine the level of effectiveness of the ISO 9001:2000 quality management standard with respect to enhanced customer satisfaction, leadership and continuous improvement (H2 - there is a significant relationship between ISO 9001 certification and enhanced customer satisfaction; H3 - there is a significant relationship between ISO 9001 certification and enhanced leadership; H4 - there is a significant relationship between ISO 9001 certification and continuous improvement);

- to determine the extent to which the organisation uses ISO 9004 to achieve improved performance (H5 - there is a significant relationship between ISO 9001:2000 certification and the use of ISO 9004 to improve performance);

- to establish the extent to which the organisation achieves synergy through the use of other business improvement approaches to enhance performance;

- to investigate the level of customer complaints pre- and post ISO 9001:2000 certification (H6 - there is a significant difference in the level of customer complaints pre- and post ISO 9001:2000 certification); and

- to make tentative recommendations arising from the empirical analysis to support the findings of the impact of ISO 9001:2000.

1.5 RATIONALE FOR THE STUDY

A limited amount of research has been carried out with respect to the effectiveness of the ISO 9001 quality management standard which therefore creates an opportunity for further research. One of the options is to test whether the new standard achieves what it has been designed to achieve, i.e. improved customer satisfaction through improved organisational performance.

The focus on customer satisfaction could lead to improved competitiveness and market position thereby elevating the organisation to a position of strength on the global stage. This is reinforced by Beattie and Sohal (1999:104) who are of the opinion that governments view ISO certification as a means of increasing the efficiency of industry with the result that organisations that make up the various industrial sectors could attract investments in South Africa and improve the country's balance of trade. Therefore, this research seeks to determine the extent to which the year 2000 revision of the ISO 9001 standard leads to improved performance and customer satisfaction thereby giving an indication of its effectiveness.

1.6 SCOPE OF THE STUDY

The case study approach will be conducted in a selected organisation from the chemical industry located in Merebank, south of Durban in KwaZulu-Natal. For the purposes of ethical considerations, the name of the organisation is not mentioned. However, a letter of informed consent has been issued by the selected organisation (refer to Annexure A).

1.7 DELIMITATION OF THE STUDY

Responses on the effectiveness of ISO 9001:2000 were obtained from the employees of the selected organisation. These responses were influenced by their level of training, knowledge and experience of ISO 9001 quality management standard in the organisation. The results of the study can therefore not be generalised as being applicable to all organisations that are ISO 9001:2000 certified.

1.8 ISO CERTIFICATION

Saraiva and Duarte (2003:1169 -1171) indicate that, from the initial publication of the ISO quality management standard up to December 2001, 510616 entities across 161 countries have obtained certification and predict, according to their statistical model, that 1000 000 entities would be ISO 9001 certified by 2006. This prediction exceeds the findings of the ISO Survey (2007) which shows that only 897866 ISO 9001:2000 certificates had been issued in 170 countries up to the end of 2006 (http://www.iso.org, 23-07-08).

1.9 EVOLUTION OF THE ISO QUALITY MANAGEMENT STANDARD

There have been four versions of the ISO quality management standard since its inception. This includes the release of the standard in the year 1987 followed by subsequent revisions in the years 1994, 2000 (Tricker and Sherring-Lucas, 2001:84-87) and 2008 (SABS, 2008:iv).

1.9.1 ISO 9000:1987

According to Gitlow, Oppenheim, Oppenheim and Levine (2005:33), the ISO 9000 series of standards were published in 1987 to promote standardisation of activities within an organisation. These standards also served the purpose of governing the quality management systems in operation.

1.9.2 ISO 9000:1994

These guidelines for quality were first revised in 1994 (ISO 9000:1994) and according to Schonberger and Knod (1997:61) changes included: making a quality manual a requirement rather than an option; intensified and more frequent references to the need to establish and document procedures and greater emphasis that the standards could be used in a wider range of organisations regardless of size or type of operation.

Evans (1997:65) asserts that the ISO 9000:1994 series of standards were quality

system standards intended to ensure that an organisation conforms to specified requirements in the areas of design/ development, production, installation and service. There existed four standards as well as a guide to assist with implementation of the standard. ISO 9000 comprised fundamentals and vocabulary pertaining to the standard; ISO 9001 applied to organisations that designed, developed, installed and serviced products; ISO 9002 to organisations engaged only in production and installation; ISO 9003 to organisations involved only with final inspection and testing and ISO 9004 served as a guide to implementation of the standard (Evans, 1997:65)

1.9.3 ISO 9000:2000

The subsequent revision of the standard (ISO 9000:2000) was carried out in order to update the standard as required by the ISO procedural rules. The ISO 9000:2000 family of standards have been developed to assist organisations, of all types and sizes, to implement and operate effective quality management systems (SABS Register 2000, 1999:24). The result of this revision, according to Russell and Taylor (2006:116), was that ISO 9000 had been reduced to three quality management standards ISO 9000:2000, ISO 9001:2000 and ISO 9004:2000. ISO 9000 defines the fundamental terms and definitions used in this family of standards; ISO 9001 sets out the requirements used to assess the organisation's ability to meet customer and applicable regulatory requirements in order to achieve customer satisfaction and ISO 9004 provides detailed guidance to an organisation for the continual improvement of its quality management system in order to achieve and maintain customer satisfaction. Interestingly, the role of ISO 9004 has changed from a guide for implementation to a guide for performance improvement.

ISO 9001:2000 replaced ISO 9001, ISO 9002 and ISO 9003 and according to Tricker and Sherring-Lucas (2001:106), the new standard was developed around a model based on eight quality management principles which reflect best management practices. These principles are: customer focused organisation; leadership; involvement of people; process approach; systems approach to management; continual improvement; factual approach to decision making and mutually beneficial supplier relationships.

Goetsch and Davis (2002:7) are of the opinion that the revised standard (ISO 9001:2000) is aligned more closely with the Total Quality Management philosophy and that the major changes include increased focus on top management commitment, customer satisfaction, emphasis on processes and continual improvement. This is reinforced by Ograjensek and Thyregod (2004:83) who suggest that a more process based structure has been introduced in ISO 9001:2000 together with a greater focus on continuous quality improvement, customer orientation and evidence based decision making. These views are supported by Zuckerman (1999:35), who contends that the focus of the revised standard on organisational processes could lead to enhanced continuous improvement and customer satisfaction.

Conti (1999:457) is of the belief that the ISO 9001:2000 standard represents a real step forward in quality, since it aims at assuring not just product quality but customer satisfaction as well. This is made possible, in part, because the standard specifies requirements for the quality management system to provide confidence that customer needs and requirements are met. West (2000:90) suggests that the requirement of the ISO 9001:2000 standard to measure customer satisfaction is one of the ways to determine whether customer needs and requirements are being met.

According to West, Cianfrani and Tsiakals (2000:42), the revised standard sets out requirements for organisations with respect to: monitoring and measuring information on customer satisfaction and/or dissatisfaction; planning of activities for the continual improvement of the quality management system; the evaluation of effectiveness of training of human resources and the provision of facilities and work environment necessary to achieve conformity. Furthermore, they believe that top management should communicate the importance of meeting customer and regulatory requirements which include ensuring that the needs and expectations of customers are understood, translated into internal requirements and met. It is expected that these revisions to the standards will put an end to organisations implementing the ISO 9001 quality management standard purely as a marketing strategy.

1.9.4 ISO 9000:2008

ISO 9001:2008, published in the latter part of 2008, represents a fine tuning of the year 2000 version of the standard as opposed to the complete overhaul, including new requirements and a sharper customer focus, that was carried out to yield the ISO 9001:2000 quality management standard (http://www.iso.org, 17-06-08). Since the ISO 9001:2008 standard is still relatively new, this study focused on the effectiveness of the ISO 9001:2000 standard in the long term and seeks to inform organisations on the merits of ISO 9001 certification.

1.10 CRITICISMS OF ISO 9000 PRIOR TO THE YEAR 2000 REVISION

There has been a great deal written about the shortcomings of the ISO 9000:1994 version of the standard. According to Markland, Vickery and Davis (1995:257), certification does not necessarily mean that an organisation produces a quality product. They contend that certification is based on an organisations's ability to establish procedure by precisely documenting its processes and then demonstrating that it is continuing to follow prescribed procedures. Markland, Vickery and Davis (1995:257) are of the belief that ISO certification guarantees consistency, not quality, and that it is not customer focused. Moreover, since there is a substantial cost factor associated with ISO registration, questions arise as to whether there is justification for expenditure on a system of quality standards that does not guarantee quality, let alone an improvement in quality.

Schonberger and Knod (1997:62) estimate that it will cost between ten and fifteen thousand dollars for an organisation to register a small plant (200 to 300 employees). This estimate is based on the assumption that registration is obtained on the first attempt and no corrective action and reassessment is necessary. The question that begs to be asked is whether this investment in quality will generate the desired payback by way of improved performance and more satisfied customers.

Schonberger and Knod (1994:43) argue that the ISO quality management standard does not certify quality of goods or services, but rather registers the existence of

proper quality plans, programmes, documentation and procedures. This view is supported by Arora (2000:3) who suggests that realising goals like the implementation of ISO 9001 are easy to achieve since it is merely a matter of documenting work procedures. However, it is claimed that organisations that have received ISO certification will not necessarily produce quality products or services.

Foster (2001:88) is unsupportive of ISO 9001 as he believes that: it is a barrier to trade; is time consuming and costly to implement; requires significant human resources and discourages free thinking and employee empowerment. Lamprecht (2000:128) is also highly critical of the ISO quality management standard and is of the view that the arrival of this standard has done little to improve the overall quality of products. Furthermore, it is argued that hard facts and statistics about the improvement from before and after ISO certification do not exist. This is reinforced by Martinez-Costa and Martinez-Lorente (2003:1189) who cite the work of Terziovski, Samson and Dow (1997); Lima, Resende and Hasenclever (2000) and Simmons (1999) in support of the findings of a study, carried out on ISO certified Spanish organisations, which revealed that there was no significant difference in the level of performance following ISO certification.

1.11 SUMMARY

This chapter reviewed the background to the ISO quality management series which included a discussion on the International Organisation for Standardisation, ISO certification, the evolution of the ISO quality management standard, and criticisms of the standard. It also highlighted the problem statement for the research, the aim and objectives of the study, the rationale for the study and the scope and delimitations of the study. A review of the literature on ISO 9001:2000, ISO 9004:2000 and various business improvement approaches will be conducted in chapter two in order to draw comparisons and establish the potential for a synergistic application of the ISO 9001:2000 standard along with any of the business improvement approaches.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

The discussion of this chapter includes the motives of various organisations for ISO 9001 certification, the need for the ISO 9001:2000 quality management standard, an assessment of the quality management principles with respect to the effectiveness of ISO 9001:2000, the use of ISO 9004 to improve performance, customer satisfaction and business improvement approaches. The latter includes Business Excellence Models; Total Quality Management; Six Sigma; Business Process Re-engineering; Quality Function Deployment and Lean Manufacturing. The potential of each of these business improvement approaches to be used in synergy with the ISO 9001 quality management standard will also be reviewed.

2.2 MOTIVE FOR ISO 9001:2000 CERTIFICATION

Martinez-Costa and Martinez-Lorente (2003:1181) who cite Meegan and Taylor (1997); Huarng, Horng and Chen (1999); Brecka (1994) and Hughes, Williams and Ryall (2000) concur that the motive for ISO certification determines the impact of implementation on the performance of the organisation. Furthermore, they are of the belief that organisations which implement ISO 9001 because of customer or supplier pressure, without believing in the benefits of the implementation of a quality system, are less likely to get positive results.

One of the criticisms aimed at the ISO 9001 quality management standard is that organisations seek certification purely for the purpose of marketing. Douglas, Coleman and Oddy (2003:320-321), found in a survey of United Kingdom organisations that the leading reasons for implementation of the standard included qualifying for tenders; improving customer service; improving organisational efficiency; and marketing benefits which was ranked fifth of a total of nine.

Thus, it can be inferred that there may be multiple motives for the implementation of the ISO 9001 quality management standard and marketing may be one and not the only reason for it.

2.3 EFFECTIVENESS OF ISO 9001:2000 QUALITY MANAGEMENT STANDARD

Gotzamani and Tsiotras (2001:1340) cite the work of Conti (1999) who contend that it is difficult to envisage how a standard-guide can offer added value to an organisation. Despite the criticism of ISO 9001:2000, there exist many divergent views for its implementation in organisations.

According to Dearing (2007:23) ISO 9001 is beneficial to organisations because it provides discipline, contains the basics of a good quality system and offers an outstanding marketing opportunity. It is believed that the discipline arises from the routine quality system reviews that are in place in order for the organisation to comply with third party audits or face the threat of losing certification. The latter could have far reaching ramifications for organisations as it could lead to loss of existing customers and reduced opportunities for securing future business contracts.

Tsiakals (2001:75) asserts that the ISO 9001 standard specifies requirements for a quality management system in which an organisation needs to demonstrate its ability to consistently provide products that meet customer requirements. Furthermore, Larson and Kerr (2007:202) affirm that this standard aims to enhance customer satisfaction through the effective application of the quality management system which includes processes for continuous improvement and conformity to customer and applicable regulatory requirements.

Basu (2004:29) is of the opinion that ISO 9001 exists to give the customer confidence that the product or service being provided will consistently meet certain specified standards of performance. It is also suggested that ISO 9001 certification means that an organisation has an extensive and appropriately documented quality management system and has proven that it constantly meets stringent standards of management of quality of product or service (Basu, 2004:29).

A common feature of the views above is the reference to the need to meet customer requirements and the use of documented quality management systems. Turusbekova, Broekhuis, Emans and Molleman (2007:471) cite the work of Evans and Lindsay (2002) who are of the belief that quality management systems such as ISO 9001:2000 comprise prescriptions for the coordination of activities in organisations in order to control, assure and improve process and product quality. The prescriptive nature of the standard is perhaps key to its effectiveness with respect to quality, customer satisfaction, leadership and continuous improvement. The latter probably explains the varying degrees of success that certain organisations achieve following implementation of the ISO 9001:2000 standard.

Gotzamani (2005:655) cites the work of Liebesman (2002) who claims that a survey carried out on 227 United States organisations revealed that a few of the key improvements resulting from ISO 9001:2000 implementation included increased customer satisfaction; better product and process quality and increased productivity. Douglas, Coleman and Oddy (2003:321) reinforce these findings in a study of United Kingdom organisations in which the highest ranked benefits of implementation of the standard included organisational consistency; improved awareness of problems; improved customer service; improved efficiency or performance and management control.

The most significant factor was that the ISO 9001:2000 quality management standards were developed with more than just conformance as a goal. The attainment of improvement in performance is crucial to ensuring customer satisfaction, higher levels of productivity and reduced costs. This is supported by Hashem and Tann (2007:634) who contend that ISO 9001:2000 is characterised by a process-oriented structure with a focus on customer satisfaction, stakeholder orientation and continuous improvement. It can be inferred that these changes along with the inclusion of the quality management principles were meant to encourage organisations to move from mere conformance with the standard to a focus on performance improvement. It is thus evident from the discussion above that ISO 9001:2000 has the necessary structure to effect improved customer satisfaction and performance.

2.4 ISO 9001:2000 QUALITY MANAGEMENT PRINCIPLES

According to Elci, Kitapki and Erturk (2007:285), the principles that support quality management have developed over many decades and currently form the foundation for the business excellence approach. These principles were developed in recognition of the need to manage product and service quality through planning, controlling and improving processes. Contemporary quality experts recommend these principles as good management practice which is significant since the principles also underpin the ISO 9001:2000 quality management standard.

Goetsch and Davis (2002:5) point out that the incorporation of the quality management principles has aligned ISO 9001:2000 closely with the Total Quality Management philosophy which focussed on leadership, customer satisfaction and continuous improvement. The eight principles as highlighted by Goetsch and Davis (2002:5) are as follows:

- Customer focus - understanding their needs and endeavouring to exceed their expectations.
- Leadership - imparting direction, unity of purpose, and a supporting work environment.
- Involvement of employees - ensuring that all employees are able to fully utilise their abilities for the organisation's gain.
- Process approach - recognising that all work is done through processes, and should therefore be managed accordingly.
- System approach to management - expands on the process approach in that achieving any objective requires a system of interconnected processes.
- Continual improvement - recognising and taking action on the basis that no process is so good that further improvement is impossible.
- Factual approach to decision making - acknowledging that well-grounded decisions must be based on analysis of factual data and information.
- Mutually based supplier relationships - synergistic results can be achieved because such relationships can enhance the ability of both to add value.

The literature set out below demonstrates the significance of each of these eight principles and their contribution to the effectiveness of the ISO 9001:2000 quality management standard.

2.4.1 PRINCIPLE 1: CUSTOMER FOCUSSED ORGANISATION

Lindborg (2003:84) is of the opinion that quality requires that complaints should not simply be tolerated but actively encouraged in order to hear the voice of the customer even when the message is not positive. It is believed that this strategic focus on the customer is necessary to create satisfaction and a relationship of integrity. The ISO 9001:2000 standard requires that the organisation communicate with the customer and obtains feedback regarding product quality.

According to Yusuf, Gunasekaran and Dan (2007:513), conforming to customer's needs and expectations is essential for success in the business world today. They further contend that organisations which understand customers' needs and provides a product or service to meet these requirements can gain competitive advantage and increased profits. This requires a focus on the customer and is addressed by the requirements of the ISO 9001:2000 standard.

Clause 5.0 of the ISO 9001:2000 standard depicted in Table 2.1 on page 15, sets out among others, the requirements with respect to management commitment, customer satisfaction and the provision of resources. Each of these requirements has to be met if the ISO 9001:2000 standard is to be effective. The subsequent discussion below seeks to verify the latter.

Table 2.1 ISO 9001:2000 Management Requirements - Clause 5

5.0	**Management System**
5.1	**Management Commitment** a. Communication of meeting customer, statutory, and regulatory requirements. b. Establishing a quality policy. c. Establishing quality objectives. d. Conducting management reviews. e. Ensuring that resources are available.
5.2	Top management shall ensure that customer requirements are determined and are met with the aim of enhancing customer satisfaction.
5.3	Management shall establish a quality policy.
5.4	Management shall ensure that quality objectives shall be established. Management shall ensure that planning occurs for the quality management system.
5.5	Management shall ensure that responsibilities and authorities are defined and communicated.
5.6	Management shall review the quality management system at regular intervals.

Source: Foster (2007:94).

West, Cianfrani and Tsiakals (2000:42) assert that the ISO 9001:2000 standard aims to focus on greater emphasis on customer satisfaction. This requires that top management communicate the importance of meeting customer and regulatory requirements which include ensuring that the needs and expectations of customers are understood, translated into internal requirements and met. Accordingly, they also indicate that the standard sets out requirements with respect to the provision of facilities and work environment necessary to achieve conformity. Dearing (2007:23) contends, in support of the latter, that customer requirements are more likely to be met if the organisation has the physical resources and support services needed to meet product requirements.

According to Gotzamani (2005:647), it is important that top management involves itself in more than just quality management system reviews and resolution of quality policy. It is suggested that they demonstrate active participation in organisational

activities. Involvement in performance improvement projects on the ground is one way of achieving this and even more important is that it is perceived by employees that engagement at this level is perhaps an indication of the concept of leading by example. The focus on the customer, provision of resources and management commitment are probably the key factors that make the ISO 9001:2000 standard effective in ensuring customer satisfaction.

2.4.2 PRINCIPLE 2: LEADERSHIP

West, Cianfrani and Tsiakals (2000:114) contend that top management is responsible for providing the vision and strategic direction for all aspects of the business. This entails taking the necessary measures to assure that all internal and external processes are structured and operated in a way that maximises internal productivity and external customer satisfaction. In order for this to be achieved, management has to demonstrate strong leadership qualities.

According to Yusuf, Gunasekaran and Dan (2007:513) as cited by Gilbert (1992), leadership is described as that quality in a person that induces others to follow. An important role of leadership is to encourage effective employee participation. Thus, positive leadership is imperative if the organisation is to benefit from the implementation of ISO 9001:2000 quality management standard which requires employee involvement in continuous improvement activities.

Foster (2007) in Sanders (2007:35) indicates that Juran's trilogy for leadership entails learning about customers and finding ways to satisfy them; highlighting and eliminating gaps that exist between product performance and product goals and the establishment of teams and provision of resources in order to make planned improvements. The formation of teams to engage in improvement activities as required by the ISO 9001:2000 quality management standard could prove to be useful in the context of restructured organisations in which the managers' workloads are inordinately high.

Mullins (2002:253) cites the work of Levine (2000) who contends that leaders need

to focus on increasing the competency of employees and the co-operation of work-teams in order to improve the organisation. Mullins (2002:262) argues that the effectiveness of the leader is dependent upon meeting three areas of need within the work group: the need to achieve the common task, the need for team maintenance and the individual needs of group members.

Table 2.2 Elements of Areas of Need within Workgroup

Task Functions	Team Functions	Individual Functions
Achieving the objectives of the work group	Maintaining morale	Meeting individual needs of the group
Defining group tasks	Building team spirit	Attending to personal problems
Planning and allocation of resources	Setting standards	Giving praise
Organisation of duties and responsibilities	Maintaining discipline	Giving status
Controlling quality and checking performance	Setting up systems of communication within the group	Training the individual
Reviewing progress	Training the group	

Source: Mullins (2002:262). [Adapted].

Table 2.2 presents various activities associated with task functions which are necessary to achieve the quality goals and team functions that are applicable to the efficient operation of workteams. Also significant is that individual functions play an important role in terms of ensuring that employees are motivated in the workplace.

Elements such as planning and allocation of resources; establishing systems of communication; training and progress review are a few of the leadership tasks that are key not only to implementing the ISO 9001:2000 quality management standard but

also in the successful maintenance of it.

2.4.3 PRINCIPLE 3: INVOLVEMENT OF EMPLOYEES

Yusuf, Gunasekaran and Dan (2007:517) cite the work of Oliver (1998) who is of the belief that involvement means to empower employees; give them information; increase their knowledge and reward quality performance. It can be inferred that the involvement of employees is essential if there is to be “buy-in” and ownership of the ISO 9001:2000 quality management system. Involvement also creates an opportunity for employees to reach their maximum potential thereby increasing personal satisfaction, productivity and most importantly, quality of output.

Employees can be empowered through education and training and it is this continuous learning and personal development that will enable them to contribute not only as individuals but also through quality circles, and as members of continuous improvement teams or project teams. This is of great significance since the ISO 9001 standard sets out the requirement that personnel performing work affecting product quality shall be competent on the basis of appropriate education, training, skills and experience. This is depicted by clause 6.2 in Table 2.3 on page 19:

Table 2.3 ISO 9001:2000 Resource Management Requirements - Clause 6

6.0	**Resource Management**
6.1	The organisation shall determine and provide needed resources.
6.2	Workers will be provided necessary education, training, skills and experience.
6.3	The organisation shall determine, provide, and maintain the infrastructure needed to achieve conformity to product requirements.
6.4	The organisation shall determine and manage the work environment needed to achieve conformity to product requirements.

Source: Foster (2007:94).

Compliance with the ISO 9001:2000 standard and passing quality management system audits are important goals but even more important is the goal of training all employees to use ISO 9001 as a framework and guide for continuous quality improvement (Levinson, 2001:36). If employees are knowledgeable about ISO 9001:2000, they will most probably be able to discern when a practice or activity does not comply with the standard thus helping to prevent non-conformance.

Pun, Chin and Gill (2001:99) cite the work of Pun and Chin (1998) who found that the adoption and implementation of employee involvement is affected by the factors depicted in Table 2.4 on page 20:

Table 2.4 Factors Affecting Adoption and Implementation of Employee Involvement

Critical Factors and Benefits	Sub-Factors and Elements
1. Management commitment	1.1 Corporate mission
	1.2 Participative management
	1.3 Continuous improvement
2. Team-building and teamwork	2.1 Common goals
	2.2 Team leadership
	2.3 Cross functional teams
3. Education and Training	3.1 Technical skills
	3.2 Problem solving skills
	3.3 Communication skills
4. Rewards and motivation	4.1 Intrinsic rewards
	4.2 Extrinsic rewards

Source: Pun, Chin and Gill (2001:99).

Table 2.4 above reflects that commitment of management; team-bullding and teamwork; education and training; as well as rewards and motivation are critical to the success of employee involvement in an organisation. It is significant that ISO 9001:2000 sets out requirements in terms of management commitment; education and training of employees. Furthermore, in ISO 9001:2000 certified organisations it is expected that good leadership ensures that the necessary task teams are established and reward systems are implemented. Extrinsic rewards could be in the form of financial incentives for improvement in quality of output while intrinsic rewards could be associated with providing employees with the skills necessary for multi-tasking and greater autonomy in carrying out their jobs, thereby, leading to increased job satisfaction.

The positive effect that ISO 9001:2000 has on employee involvement in the

organisation is elaborated on by Ali, Jemain, Yusoff and Abas (2007:106) who suggest that giving due attention to employees will improve their motivation as well as their level of organisational commitment. They are of the belief that this can be achieved by empowering employees in order to encourage involvement as well as the use of an appropriate reward and recognition system to stimulate participation. This inclusivity results in the employees demonstrating their acceptance of organisational goals and a willingness to exert effort on behalf of the organisation thereby leading to increased quality of output and productivity.

Heizer and Render (2008:200) claim that the task of designing equipment and processes that produce the desired quality are best done with a high level of involvement by those who understand the shortcomings of the system. The shop-floor employees deal with the system on a daily basis with the result that they understand it better than anyone else and it therefore makes sense to empower them through involvement in the process of design. This is supported by Levinson (2001:33), who states that while managers play a vital role in providing direction, resources and vision, they must look past their roles to reap the greatest benefits of the ISO 9001:2000 standard. Thus, if management commits to ISO 9001, the focus must shift to employee involvement since they are the closest to the job and understand it better than anyone else.

Techniques for building employee empowerment include building communication networks that include employees; developing supportive supervisors; moving responsibility from management to production employees; fostering high-morale organisations and creating formal organisational structures such as continuous improvement teams and quality circles (Heizer and Render, 2008:200). The aforementioned techniques are probably instrumental in the effectiveness of ISO 9001:2000 with respect to leadership.

It can therefore be concluded that employee involvement is a key factor to motivating employees to utilise their full potential in the discharge of their duties. This benefits the employee and the organisation through greater job satisfaction and improved performance respectively.

2.4.4 PRINCIPLE 4: PROCESS APPROACH

According to West (2001:65), the ISO 9001:2000 standard requires identification of the processes of the quality management system, along with their sequence and interactions. Thus, with the aid of techniques such as process mapping, the quality management system has to reflect the actual way in which the organisation operates. The essence of the process approach is to help align an organisation's written processes with actual practice to create a more effective system.

Given that the ISO 9001:2000 standard requires that an organisation should identify and manage all the processes necessary for achieving its objectives as well as define the interrelationship of these processes, Westcott (2007) in Sanders (2007:32) contends that there are certain basic principles that should be adhered to in order to accomplish this. These include the identification of primary processes of the organisation, naming the owner of each process and mapping the flow of each process. This process orientation or approach in an organisation, according to Sever (2007:48), helps departments and managers to be pro-active in choosing to jointly own problems. This approach ensures that employees understand upstream and downstream requirements which becomes a priority in their daily work (Sever, 2007:48). The process approach is therefore useful in facilitating interdepartmental communication required for improvement.

The assertion by Yusuf, Gunasekaran and Dan (2007:517) that every employee participates in the quality process in a role of shared responsibility, is highly significant. They argue that although employees and work groups may have different tasks, they share common objectives. Thus, each employee or member of work group should do their own work well and understand the work of others so as to ensure that the whole process operates effectively.

Westcott (2007) in Sanders (2007:32) further asserts that the measures used to control and assess the outputs and effectiveness of each process should be clearly stipulated and the impact of each process and its interaction with each of the other processes should be determined. He also suggests that an evaluation of the effect of

each process on the organisation's desired outcomes be carried out and a plan developed and implemented for improving processes where warranted. This system of implementing objective measures will probably give a clear indication of processes that may or may not add value as well as highlight areas for potential improvement. Tsiakals (2001:76) supports this view and is of the opinion that the process approach emphasises the importance of aspects within the quality management system such as understanding and meeting requirements and the need to consider processes in terms of added value. Furthermore, he contends that the assessment of process performance and effectiveness and the continual improvement of processes based on objective measurement are aspects that are just as important.

An important tool that could possibly be used to improve performance is the plan-do-check-act (PDCA) cycle. Ultimately all processes in an organisation can be subjected to the PDCA cycle which is described as a conceptual basis for problem solving. The objectives and processes necessary to deliver results in accordance with the requirements of the customer and the organisation are established and implemented. Processes are monitored and measured against policies, objectives and requirements for the product. The results are reported and actions are taken to continually improve process performance (Stevenson, 2002:475). Thus, the process approach, an integral aspect of ISO 9001:2000, is probably the most significant contributor to improved organisational performance.

2.4.5 PRINCIPLE 5: SYSTEMS APPROACH TO MANAGEMENT

Sa' and Abrunhosa (2007:58) are of the opinion that organisations are made up of highly interdependent parts that must work together in order to achieve the system's overall aim. Tricker and Lucas (2001:117) state that identifying, understanding and managing a system of inter-related processes for a given objective contributes to the effectiveness and efficiency of the organisation. Thus, the ISO 9001:2000 quality management standard can perhaps be viewed as a system that optimises all resources on the path to achieving organisational objectives.

2.4.6 PRINCIPLE 6: CONTINUAL IMPROVEMENT

Continual improvement along with the process approach are quality management principles that contribute significantly to the effectiveness of ISO 9001:2000 in respect of performance improvement in the organisation. Gilgeous (1997:434) contends that continuous improvement is a process of ongoing improvements that are introduced to add value to an organisation's processes in order to satisfy the customer. This is consistent with the view of Czarnecki, Schroer, Adams and Spann (2000:75), who believe that continuous improvement is a management philosophy and system that organises employees and processes to maximise customer value and satisfaction through a set of tools and techniques which include flowcharts, frequency histograms, Pareto diagrams, cause and effect diagrams and control charts.

Yusuf, Gunasekaran and Dan (2007:514) cite the work of Love and Li (1998) who suggested that continuous improvements can be based on organised and habitual improvements of processes in small stages rather than on breakthroughs and innovative advances. This requires the elimination of error, removal of slack and reduction in variation through processes that are more effective, efficient and adaptable. In addition to this, Liebesman (2004:62) contends that preventive action is aimed at eliminating the cause of potential non-conformities while corrective action involves the use of information on customer satisfaction; conformity to product requirements and suppliers to eliminate causes of identified actual non-conformities in order to prevent their recurrence.

West, Cianfrani and Tsiakals (2000:42) highlight that the ISO 9001:2000 standard specifies requirements for organisations with respect to monitoring and measuring information on customer satisfaction which helps in the planning of activities for the continual improvement of the quality management system. However, Suganthi and Samuel (2004:165), argue that the measurement of performance only will not result in improvement but that the latter requires an organisation-wide strategy that links performance measurement to the implementation of specific system improvements. They therefore suggest that, with this in place, the performance measures are expected to drive the continuous improvement process. This in turn helps in providing

feedback on the measures which can then perhaps be used to shape the strategies being developed to ensure customer satisfaction.

2.4.7 PRINCIPLE 7: FACTUAL APPROACH TO DECISION MAKING

Payne (2007) in Sanders (2007:26) states that measurement is the process of determining a quantitative value for something and refers to two broad types of measurements made in business quality management systems. Measurements can be categorised as process oriented or physical with the latter being associated with the finished product. Furthermore, Westcott (2007) in Sanders (2007:32) elaborates on the use of business measures to check the levels of quality and customer satisfaction. This entails monitoring quality through the use of an in-process and outgoing finished product or service inspection while customer satisfaction is measured with statistics derived from reports of product or service failures and other indicators such as, surveys. According to Stein (2001:30), the purpose of business measurement is to ensure that appropriate and timely decisions can be made that will permit required measures or actions to be carried out. This is significant in terms of the requirements of ISO 9001:2000. Foster (2007:95) cites the requirements of clause 8.0 of the ISO 9001:2000 quality management standard in respect of measurement, analysis, and improvement. This is presented in Table 2.5 on page 26:

Table 2.5 ISO 9001:2000 Measurement, Analysis and Improvement Standards - Clause 8

8.0	**Measurement, Analysis, and Improvement**
8.1	The organisation shall plan and implement the monitoring, measurement, analysis and improvement process for continual improvement and conformity to requirements.
8.2	The organisation shall monitor information relating to customer perceptions.
8.3	The organisation shall ensure that product that does not conform to requirements is identified and controlled to prevent its unintended use or delivery.
8.4	The organisation shall determine, collect, and analyse data to demonstrate the suitability and effectiveness of the quality management system, including: a. Customer satisfaction b. Conformance data c. Trend data d. Supplier data
8.5	The organisation shall continually improve the effectiveness of the quality management standard.

Source: Foster (2007:95).

Table 2.5 reflects the requirement for the organisation to collect and analyse data in order to prove the suitability and effectiveness of the quality management system. Reid (2001:70) contends that by having the appropriate data on hand, the current status of process performance or product quality is known and improvements accomplished thereby leading to an increase in customer satisfaction. This is supported by Tricker and Lucas (2001:117) who claim that effective decisions can only be made if it is based on the logical and intuitive analysis of data and information.

Hsu (2007:420) cites Kanji's (2003) Business Excellence model, which highlights that the first stage of being able to improve is having knowledge of the current performance levels of all the employees and the products or services in the customers' possession. If the organisation has information on its current status, then it is possible for any improvement to be measured. Presenting this information to employees ensures that decisions are based on fact rather than intuition which is

essential for continuous improvement (Hsu, 2007:420). This is reinforced by Sa' and Kanji (2003) in Ali, *et al*. (2007:99) who are of the view that by having knowledge of the real path for excellence, an organisation can identify where to improve and use the limited resources more effectively for improvement. This approach aptly represents the aim of ISO 9001:2000 using the factual approach to decision making.

2.4.8 PRINCIPLE 8: MUTUALLY BENEFICIAL SUPPLIER RELATIONSHIPS

A further opportunity to improve quality of output and customer satisfaction is through supplier relationships conducted in a manner that benefits both parties. One of the quality management principles underpinning the ISO 9001:2000 standard requires that the organisation engages in mutually beneficial supplier relationships.

Reid (2001:66) cites the work of Deming (1986) who is of the opinion that reduction of process variation could be achieved through single sourcing of suppliers and their long-term relationships based on trust. Foster (2007:267) supports this and suggests that a major part of quality improvement requires developing and assisting suppliers in order that they could reliably provide required products with low levels of defects, while conforming to requirements. Furthermore, he believes that the efficiency of the supplier relationship can be improved through information sharing and improved communication. Thus, organisations that engage in mutually beneficial supplier relations are more likely to have higher quality inputs into its processes which in turn increases the probability of higher quality outputs and increased customer satisfaction.

It is apparent from the literature review above, that the combination of the requirements of the standard and the quality management principles will most likely lead to ISO 9001:2000 being effective with respect to enhancement of customer satisfaction, leadership and continuous improvement.

2.5 PERFORMANCE IMPROVEMENT THROUGH THE USE OF ISO 9004

According to Boys, Karapetrovic and Wilcock (2004:844), ISO 9001 and ISO 9004 were created as a consistent pair of standards so that organisations needing to exceed the requirements of ISO 9001 could use the principles of ISO 9004 to move towards business excellence. Furthermore, they claim that management systems modelled after the ISO 9004 guideline are based on a set of eight quality management principles which, when compared with concepts of excellence used as a framework for Business Excellence Models, are found to be very similar. This is illustrated in Table 2.6 on page 29:

Table 2.6 Comparison of ISO 9004 Principles to Business Excellence Models

ISO 9004 Quality management principles	MBNQA Core values and concepts	CFBE Principles for excellence	EFQM Concepts of excellence
Customer focussed organisation	Customer driven excellence	Primary focus on stakeholders/ customers and the marketplace	Customer focus
Leadership	Visionary leadership	Leadership through involvement	Leadership and constancy of purpose
Involvement of people; Mutually-beneficial supplier relationships	Valuing employees and partners	Cooperation and teamwork	People development and involvement; Partnership development
Process approach		Prevention-based process management	
	Focus on results and creating value		Results orientation
System approach to management	Systems perspective		
Continual improvement	Organisational and personal learning; Managing for innovation	Continuous learning and people involvement	Continuous learning, innovation and improvement
Factual approach to decision making	Management by fact; Public responsibility and citizenship; Focus on the future	Factual approach to decision making; Fulfill obligations to all stakeholders and society; Focus on breakthrough thinking	Management by processes and facts; Public responsibility
	Agility		

Source: Boys, Karapetrovic and Wilcock (2004:847).

The Business Excellence Models used to draw the comparison included the Malcolm Baldrige National Quality Award (MBNQA), the Canadian Framework for Business Excellence (CFBE) and the European Foundation for Quality Management (EFQM). The key differences highlighted include emphasis of ISO 9004 on the process approach as opposed to the results orientation of Business Excellence Models. A further difference is that there is no mention of public or social responsibility and citizenship in any of the ISO 9004 guiding principles which could be perceived as a

limitation (Boys, Karapetrovic and Wilcock, 2004:855). Despite these shortcomings, Conti (2001:120) is of the opinion that ISO 9001 should be viewed as the basic requirement setting standard and ISO 9004 as being one among the existing Business Excellence Models.

Boys, Karapetrovic and Wilcock (2004:844-845) indicate that while ISO 9001 is designed to provide customer satisfaction, ISO 9004 is intended to extend this objective to include a wider band of stakeholders which include employees, investors, suppliers, partners and the community at large. They contend, however, that ISO 9004 is not being used extensively and when it is used, it does not accomplish the role for which it was designed. It is therefore apparent that organisations are not maximising the benefits to be gained through the use of the consistent pair of standards.

2.6 CUSTOMER SATISFACTION

Yu (2007:556) cites the work of Fornell (1992) who is of the opinion that providing a high level of customer satisfaction is associated with higher customer loyalty and enhanced reputation. Thus, this highlights the need for organisations to focus on satisfying customers. According to West (2001:70), the ISO 9001:2000 standard requires organisations to monitor information relating to customer perception on whether it has met customer requirements and that this information is to be used as a measure of the performance of the quality management system.

More importantly, Reid (2001:66) highlights that ISO 9001:2000 requires top management to ensure customer requirements are determined and fulfilled and also commits them to communicating to the organisation the importance of meeting customer requirements. He also suggests that no matter which model is in operation in the organisation, there is a need to understand current and future customer needs and continually work to satisfy them.

Pestorius (2007:22) supports the notion that meeting customers' desires should be the organisations's most important task and should drive the overall strategy of the

business. Moreover, Finch (2003:516) suggests that many businesses see each customer as a potential long-term source of income rather than a one-time buyer. This brings the importance of customer relationships to the fore reinforcing the view that customer relationships need to be strengthened as competition for customers increases.

Craig and Roy (2004:77) cite the work of Crosby (1991) who suggest that customer satisfaction measurement is one of the principal means for focussing an organisation on the customer. Also, Craig and Roy (2004:77) cite the work of Hill (1996) who concur that customer satisfaction measurement can be of individual transactions or of service quality and for it to be of value, it should identify priority areas for improvement. Suganthi and Samuel (2004:108) suggest that there are many tools and sources that can be used to gather information from customers which include surveys, telephone calls, complaint reports, trade trials, customer audit, sales force and consultants.

It is important to note that customers have become very knowledgeable and more demanding. Feigenbaum (2007:37) is convinced that data not only shows that prospective customers focus on information that ensures products perform properly but also that many of them expect and search for clear performance information on product related quality value factors. These include elements such as the timely delivery of product, product support after purchase, the most recent product technology, clear information regarding product (usage, safety and operating life) and excellent customer service.

It is therefore evident that organisations need to orientate their focus on the customer if they are to be sustainable in the long term. This requires that customer requirements are determined and met effectively in order to stay ahead of competitors. The requirement of ISO 9001:2000 standard helps ensure that this occurs. Moreover, organisational processes should be managed in a manner that will ensure the achievement of customer satisfaction. The literature review below highlights a study of the comparison and possible interdependence between ISO 9001:2000 quality management standard and various business improvement approaches with the aim

of determining whether any synergy exists between them. It will also present the extent to which they contribute to improving customer satisfaction.

2.7 BUSINESS IMPROVEMENT APPROACHES

Warnack (2003:42) is of the opinion that most business improvement approaches are probably prone to failure because they are not linked to the disciplines of an effectively administered ISO 9001 quality management system. Furthermore, he contends that the ISO 9001 quality management system may help to overcome these problems. This could be achieved by creating a single point of reference for all continual improvement activities, clearly defining the critical characteristics of the business improvement programme and using a proven internal audit methodology that can be adapted to the specific needs of the business. He believes that this will ensure ongoing effectiveness of that particular programme (Warnack, 2003:42).

This view is reinforced by Reid (2001:70) who suggests that organisations should design and implement a management system based on the fundamentals of quality in order to achieve growth and sustain itself. He asserts that this could be initiated by using ISO 9001:2000 as a template to enhance other elements to drive efficiency and effectiveness**.**

There are many approaches to improving organisational performance which include Business Excellence Models, Total Quality Management, Six Sigma, Business Process Re-engineering, Quality Function Deployment and Lean Manufacturing. Each of these approaches will be examined in order to review its workings and to determine whether synergies exist between any of these approaches and the ISO 9001:2000 quality management standard.

2.7.1 BUSINESS EXCELLENCE MODELS

According to Kanji and Sa' (2007:49), an organisation needs to know what its main strengths and weaknesses are in order to improve. They believe that this is the role of any effective performance measurement system which has to be based on true

performance drivers such as customer satisfaction, process management, teamwork, empowerment and continuous improvement. It is significant that most of these factors form the basis of many business excellence models in existence.

Lee (2002:142-143) points out that many countries have established National Quality Awards or Business Excellence Awards to recognise deserving companies. Examples of these awards include the Malcolm Baldrige National Quality Award; the United Kingdom Quality Award and the European Quality Award. Shergold and Reed (1996:49) contend that Business Excellence Models are based on the assumption that customer satisfaction, employee satisfaction and impact on society are achieved through leadership driving policy and strategy, employee management, resources and processes, leading eventually to excellence in business results. However, Hsu (2007:419) argues that people have to know what to do and how to do it in order to achieve organisational excellence. He therefore suggests that Kanji's (1998) set of governing principles which include delighting the customer, people based management, continuous improvement, and management by fact be used as a means of achieving organisational excellence.

According to Gaither and Frazier (2002:275) the purpose of the Malcolm Baldrige National Quality Award is to recognise United States organisations that attain greatest quality leadership and to encourage other United States organisations to improve their quality programmes. This is achieved through the development and publication of award criteria that serve as quality improvement guidelines. Gaither and Frazier (2002:275) state that the criteria used to evaluate applicants for this award include:

- the organisation's leadership system;
- the effectiveness of strategic and business planning and deployment of plans with a strong focus on customer and operational performance requirements;
- how the organisation determines customer and market requirements and expectations, enhances relationships with customers, and determines their satisfaction;
- the effectiveness of information collection and analysis to support customer-driven performance excellence;

- the level of success of efforts to realise the full potential of the workforce;
- the effectiveness of systems and processes for assuring the quality of products and services; and
- performance results, trends and comparison to competitors in key business areas.

It is significant that the award criteria are designed to encourage greater management commitment and enhanced relationships with customers to better understand their requirements so as to improve customer satisfaction levels. There is also an emphasis on the development and involvement of employees in order to maximise their contribution along with an improvement in quality of products through effective systems and efficient processes.

Daniels (2007:51b) states that the ISO 9001 quality management standard combines with the Baldrige criteria at Mesa Products Inc. to bind business processes in an integrated, aligned direction, resulting in performance excellence. Similarly, the Winnipeg Property Assessment Department developed and implemented the Pursuit of Excellence Quality Management System (PEQMS). The Pursuit of Excellence Quality Management System is based on ISO 9001:2000 quality management principles along with the customer-centred approach to achieving quality. This approach was developed by the Treasury Board of Canada for government services. The department uses PEQMS to demonstrate to the public and other stakeholders that it is capable of providing quality assessments and customer service resulting in both equitable taxation and customer satisfaction (Ntungo, 2007:135-136).

Bendell (2000:14) is of the opinion that both ISO 9001 and business excellence models are necessary in the pursuit of organisational excellence. Furthermore, he believes that excellence is a concept that focuses mainly on self-assessment on a wide range of factors while ISO 9001 provides the focus on detail, compliance and third party audit. This two-pronged approach can provide assurance of responsibility, systems and resources within an excellence framework.

It is evident from the above discussion that the probability of ISO 9001 certified

organisations improving their level of performance is greatly enhanced through the use of Business Excellence Models and vice versa. This is possible because the stringent requirements and discipline of ISO 9001 complements and to a certain extent, overlaps the business excellence concepts that characterise these models.

2.7.2 TOTAL QUALITY MANAGEMENT

According to Lee (2002:142) global competitiveness is becoming increasingly intense as more countries are adapting to the free market model and opening their borders for investments and trading. Thus, it is believed that an organisation's cardinal business strategy should be to focus on customers in order to stay ahead of the competition. The customer-focus view is reinforced by Heizer and Render (2008:198) who contend that Total Quality Management (TQM) emphasises a commitment by management to have a continuing organisation-wide drive towards excellence in all aspects of products and services that are important to the customer.

Russell and Taylor (2006:86) assert that the customer defines quality and achieving customer satisfaction as top priority. Furthermore, they indicate that top management should provide the leadership for quality and that this should occur on a strategic level. They view quality as the responsibility of every employee at every level of the organisation. Thus, all functions of the organisation are expected to focus on continuous quality improvement in order to achieve strategic goals. Furthermore, they assert that training and education of all employees is the basis for continuous quality improvement with quality problems being solved through cooperation among employees and management.

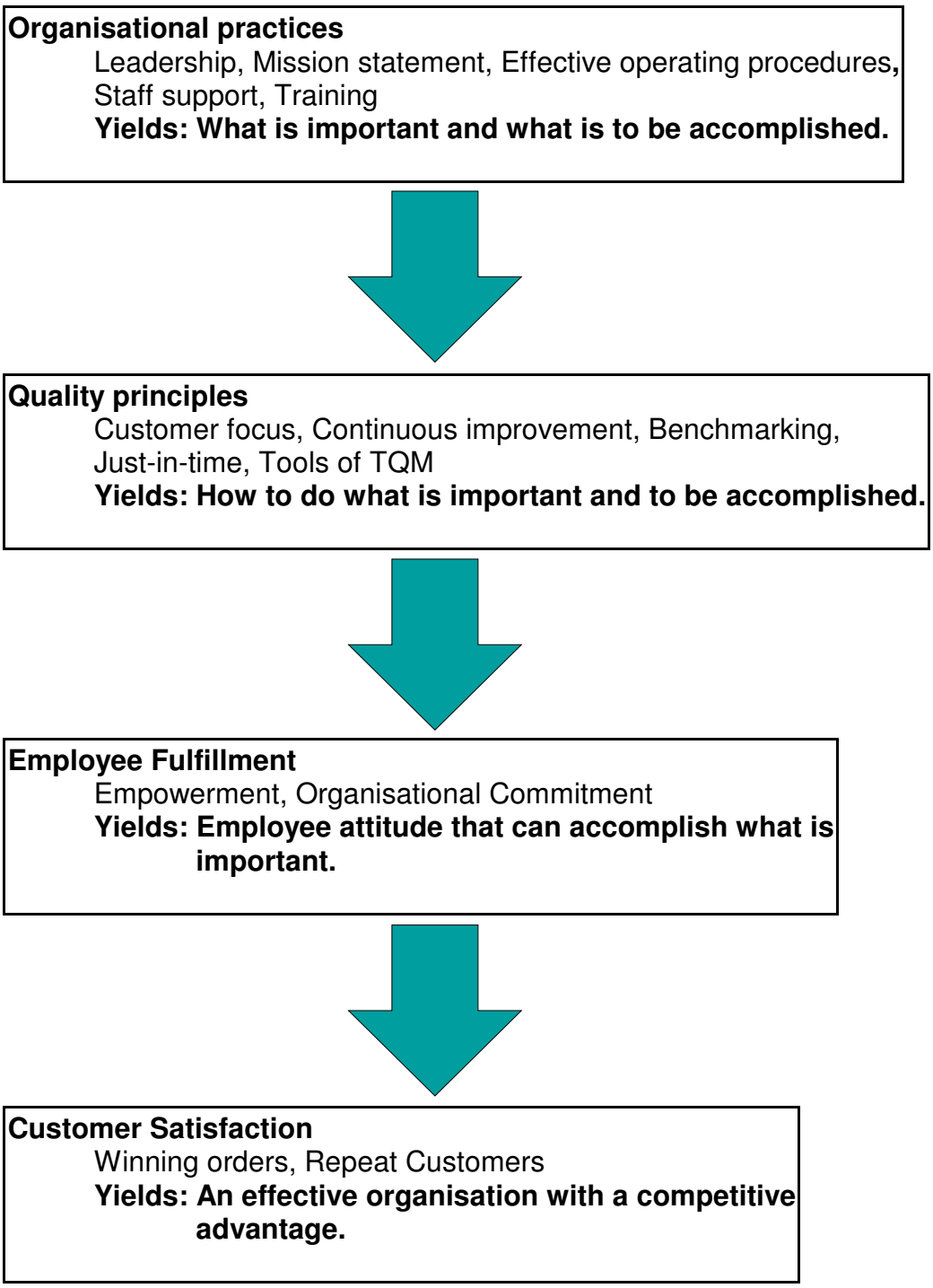
Prajogo and Sohal (2004:205) contend that Total Quality Management has been one of the most prominent developments, as a source of competitive advantage, in the management field in the last two decades. The reason for this is that the main thrust of Total Quality Management is a set of management principles that revolve around quality improvement in all functional areas and at all levels in an organisation. Lee (2002:142) is of the view that the core principles of Total Quality Management encourage business practices that result in satisfied customers, cost reduction,

increased productivity, and enhanced quality outputs.

Sa' and Abrunhosa (2007:58) cite the work of Kanji (2002) who believes that Total Quality Management is a management philosophy that fosters an organisational culture committed to customer satisfaction through continuous improvement. This is reinforced by Elci, Kitapki and Erturk (2007:287) who view TQM as a continuous pursuit of excellence by creating the right skills and attitudes in people to make prevention of defects possible and satisfying customers totally at all times.

According to Heizer and Render (2008:195), the activities that are necessary to achieve TQM are shown in Figure 2.1 on page 37:

Figure 2.1 The Flow of Activities Necessary to Achieve TQM



Source: Heizer and Render (2008:195).

Martinez-Costa and Martinez-Lorente (2003:1181) cite the work of Sun (2000) who is of the opinion that ISO 9000 registration should be carried out as a first step in the process of TQM system implementation in order to secure competitive advantage. Mahadevappa and Kotreshwar (2004:304) conclude, following their study on ISO 9000 certified Indian organisations, that ISO 9000 is not an end in itself but only the first step on the endless road to quality with the next step being TQM implementation.

Baidoun (2004:134) cites the work of James (1996) who believes that an accredited quality management system is a major pillar supporting the development and operations of TQM. According to Ruzevicius, Adomaitiene and Sirvidaite (2004:188), a quality management system can serve as an interim instrument for implementation of TQM in an organisation. Thus, the formal documented quality management system presented by ISO 9001 is probably useful in the successful implementation of TQM.

While there is some support for ISO 9001 implementation as a precursor to Total Quality Management, a more integrated approach is supported by Tonk (2000:51), who believes that ISO 9001:2000 certification, a TQM approach and the Malcolm Baldrige National Quality Award (MBNQA) criteria, will allow an organisation to implement a well-grounded quality programme. Tonk (2000:51) is of the opinion that this will only be possible if the organisation makes the necessary effort to use these approaches and their related tools to create, maintain and continuously improve quality. There are many tools and methodologies common to all three approaches which include value engineering; cycle time management; team building and problem solving; continuous quality improvement; poka-yoke and root cause analysis.

It is evident from the discussion above that the ISO 9001 quality management standard is viewed as a forerunner to the implementation of TQM. Perhaps, a more effective approach, is the suggestion by Tonk (2000:51) that ISO 9001 should be implemented in conjunction with TQM and a relevant Business Excellence Model in order to yield the best results for the organisation.

2.7.3 SIX SIGMA

Davison and Al-Shaghana (2007:250) cite the work of Erwin and Douglas (2000) who suggest that the Six Sigma management programme leads to a corporate culture change and is represented by a paradigm shift toward an expectation of the highest quality. This is anticipated to fuel the drive of employees for continuous improvement. However, Shanmugam (2007:77) contends that the success of the Six Sigma programme depends on top management as well as employees at all levels of the organisation. The latter suggests the need for management commitment and employee involvement if this approach is to be successful.

Mellat-Parast, Jones and Adams (2007:45) state that Six Sigma is a data driven philosophy, with a major focus on financially measurable results. This is used to influence management decisions and trigger action across the organisation resulting in reduced waste, increased customer satisfaction and improved processes. The result of this approach is best described by Daniels (2007:48a), who is of the opinion that Six Sigma is about quality, continuous improvement and sustained excellence which should be the mission of every organisation. Pestorius (2007:19) argues that the latter is made possible because of the use of standardised, documented and repeatable problem solving methodology.

Slack, Chambers, Johnstone and Betts (2006:435) contend that the Six Sigma approach uses significant resources and training to develop practitioners, on various levels, who lead improvement initiatives in the organisation. Slack, *et al.* (2006:435) distinguish between Master Black Belts, Black Belts and Green Belts. Master Black Belts are experts in the use of Six Sigma tools and techniques and are seen as teachers who guide improvement efforts and coach Black Belts and Green Belts. Black Belts are trained to be directly involved in organising improvement teams and are expected to develop their quantitative analytical skills as well as act as coaches for Green Belts. Green Belts work within improvement teams, possibly as team leaders who have normal process responsibilities but are expected to spend at least twenty percent of their time on improvement activities (Slack, *et al.,* 2006:435). This approach demonstrates the importance attached to developing and empowering

employees in the workplace which overlaps with one of the quality management principles associated with the ISO 9001:2000 quality management standard regarding employee involvement.

According to de Mast and Bisgaard (2007:25), the Six Sigma conformance quality target of 3.4 defects per million opportunities is less important than the structure and prescribed method it provides for managing an organisation's improvement initiatives. The Six Sigma method set out in Table 2.7 below makes reference to critical to quality characteristics (CTQs) which represents system behaviour and is a function of a number of factors (x) that affect the process. This is depicted by the formula: $y = f(x1, x2, ..., xn)$ where y is the system behaviour and x is the causal factor. It can be seen that the Six Sigma approach takes into consideration every factor that could potentially affect the overall system effectiveness. This is much like the system approach used during problem solving or improvement exercises in ISO 9001:2000 certified organisations.

Six Sigma is a disciplined approach that assists organisations to consistently meet customer requirements and drives continuous improvement through process focussed management. Six Sigma organisations follow a stringent process improvement methodology as set out in Table 2.7 on page 41 which entails the use of data to manage by fact (Fritsch and Norris, 2001:39). The process improvement methodology referred to above is synonymous with the process approach adopted in ISO 9001 certified organisations in order to realise performance improvement.

Table 2.7 Six Sigma's DMAIC Method

Define	Select problem and perform cost-benefit analysis.
Measure	Translate the problem into a measurable form, gather data and assess the current situation.
Analyse	Identify influence factors and causes that determine the critical to quality (CTQ) characteristic's behaviour.
Improve	Design and implement modifications to the process to improve the performance of the CTQs.
Control	Adjust the process management and control system to ensure improvements are sustainable.

Source: de Mast and Bisgaard (2007:26).

According to Pearson (2001:37-38) the objective of the measurement stage of Six Sigma is to gain a complete measure of the performance of key process variables. It is suggested that this is necessary to understand the operation of these measures within a complex system to produce acceptable products in a timely manner, at the optimal cost, in a way that meets the needs of the customer and the organisation. Six Sigma programmes place emphasis on good information management as part of their support base as is illustrated in Figure 2.2 on page 42. Since it is expected that decisions made in ISO 9001 certified organisations are based on fact, the Six Sigma approach to and handling of process data possibly makes it ideally suited for application in these organisations.

Figure 2.2 The Automated Knowledge Supply Chain Enhances Six Sigma Success

Big business advantages				
Six Sigma Programmes				
Raw data	Information	Knowledge	Organisation wisdom	Six Sigma Decisions
Automated knowledge supply chain				
Advanced measurement systems				
Raw materials	Components	Subassembly	Final assembly	Delivered product

Source: Pearson (2001:38).

Giddens (2007:24) refers to an army aviation depot (Corpus Christi Army Depot) that focussed on issues of quality, cost and delivery. This was achieved by adopting ISO 9000, Six Sigma and Lean Manufacturing to achieve rapid improvements in labour cost, space utilisation, cost overruns and on-time delivery. Sanders (2007:31) believes that because ISO 9001 is process based, many organisations find that it fits well with other quality related techniques such as Six Sigma and Lean Manufacturing.

According to Giddens (2007:24), the ISO 9000 series of standards requires an organisation to have a tool for continuous improvement. Six Sigma is one such tool that can be used to accomplish positive results because it is complementary to ISO 9000. This view is also supported by Arauz and Suzuki (2004:32) who believe that the road to customer impact may be more effective if the ISO 9000 quality management standards are integrated with quality programmes like Six Sigma.

It is thus evident from the literature that the Six Sigma approach and ISO 9001 quality management standard can support each other and that there is perhaps adequate common ground for an integrated approach involving both.

2.7.4 BUSINESS PROCESS RE-ENGINEERING

Chang (2007:485) cites the work of Hammer and Champy (1993) who define Business Process Re-engineering as "the basic rethinking and revolutionary redesign of business processes to achieve substantial improvements in critical measures of performance such as cost, quality, service and speed". Waller (2003:191) reinforces that these improvements are made possible by the application of a variety of tools and techniques which focus on the business as a set of related customer-oriented core business processes rather than a set of organisational functions.

According to Slack, *et al*. (2006:429) the essence of Business Process Re-engineering is a redefinition of the processes within a total operation to reflect the business processes that satisfies customer needs. Furthermore, they believe that the main principles of Business Process Re-engineering includes rethinking business processes in a cross-functional manner such that work organisation is based on the natural flow of information or materials or customers. This entails organising work based on process outcomes rather than tasks that make up the process. Chang (2007:486) cites the work of Davenport (1993) who is of the opinion that this would require high levels of process innovation across the organisation.

The process approach, which is a fundamental aspect of Business Process Re-engineering, is also key to the success of performance improvement activities in ISO 9001 certified organisations. Thus, Business Process Re-engineering could, to a certain extent, prove to be a useful approach to improving process performance and customer satisfaction in ISO 9001 certified organisations.

2.7.5 QUALITY FUNCTION DEPLOYMENT

Cheng and Chiu (2007:452) cite the work of Jeong and Oh (1998); Ozgener (2003); and Trappey, *et al*. (1996) who believe that the application of Quality Function Deployment (QFD) is becoming increasingly important as a result of it being recognised as an excellent systematic approach to mapping customer requirements into definable and measurable product and process parameters.

According to Waller (2003:103) Quality Function Deployment is an analytical method which focuses and coordinates capabilities within an organisation in order to design, manufacture and market goods desired by customers. Furthermore, Jiang, Shiu and Tu (2007:30) believe that the marketing personnel, design engineers, operations personnel and suppliers have to work closely together in order to produce a product that will meet customer requirements. The view is that this approach could lead to benefits such as lower product development costs, higher levels of customer satisfaction and increased market share.

Meeting customer requirements and customer satisfaction is at the heart of Quality Function Deployment. This technique could prove useful in ISO 9001 certified organisations in which the standard specifies that customer requirements be determined and met in order to ensure customer satisfaction.

2.7.6 LEAN MANUFACTURING

According to Gaither and Frazier (2002:464) Lean Manufacturing is a philosophy of production that emphasises the minimisation of the resources used in the various activities of the enterprise. This involves identifying and eliminating non-value-adding activities in design, production, and management of the supply chain. Waller (2003:458) suggests that organisations which embrace this approach should be viewed in terms of a supply chain of value streams that extends from suppliers of raw materials, through transformation, to the customer.

This approach aims to produce products of perfect quality and achieves this by organising workers in teams that have continuous quality improvement as a goal. Furthermore, the use of a product or cellular manufacturing layout along with the Just-In-Time (JIT) technique is crucial to the success of the Lean Manufacturing approach. Finally, in order to foster mutually based supplier relationships, it is essential that suppliers be regarded as part of the team and be included in decisions and activities related to manufacturing and assembly (Waller, 2003:458).

Lean manufacturing and ISO 9001 share a common ground in terms of the need for continuous improvement, employee involvement and mutually based supplier relationships. This indicates a degree of interdependence which could lead to enhanced performance due to the synergy that exists between Lean Manufacturing and the ISO 9001 quality management standard.

2.8 SUMMARY

There may be multiple motives in an organisation for the implementation of the ISO 9001 quality management standard and marketing may be one and not the only reason for it. Despite the criticisms levelled against ISO 9001, there are many who advocate the implementation of this quality management standard. The application of the eight quality management principles renders the ISO 9001 quality management standard more effective which consequently leads to enhanced performance and customer satisfaction. To a large extent, ISO 9004 is not being used in the role for which it was designed. It was meant to address the satisfaction of a wide range stakeholders which include employees, investors, suppliers, partners and the community.

A review of various business improvement approaches reveal there is potential for an integrated approach with respect to the ISO 9001:2000 quality management standard and one or more of Business Excellence Models, Total Quality Management and Six Sigma. Approaches such as Business Process Re-engineering, Quality Function Deployment and Lean Manufacturing could be used to contribute to improved performance in ISO 9001 certified organisations.

The research method employed in this study and an overview of the organisation in which it was carried out is discussed in the subsequent chapter.

CHAPTER 3

RESEARCH METHODOLOGY AND DESIGN

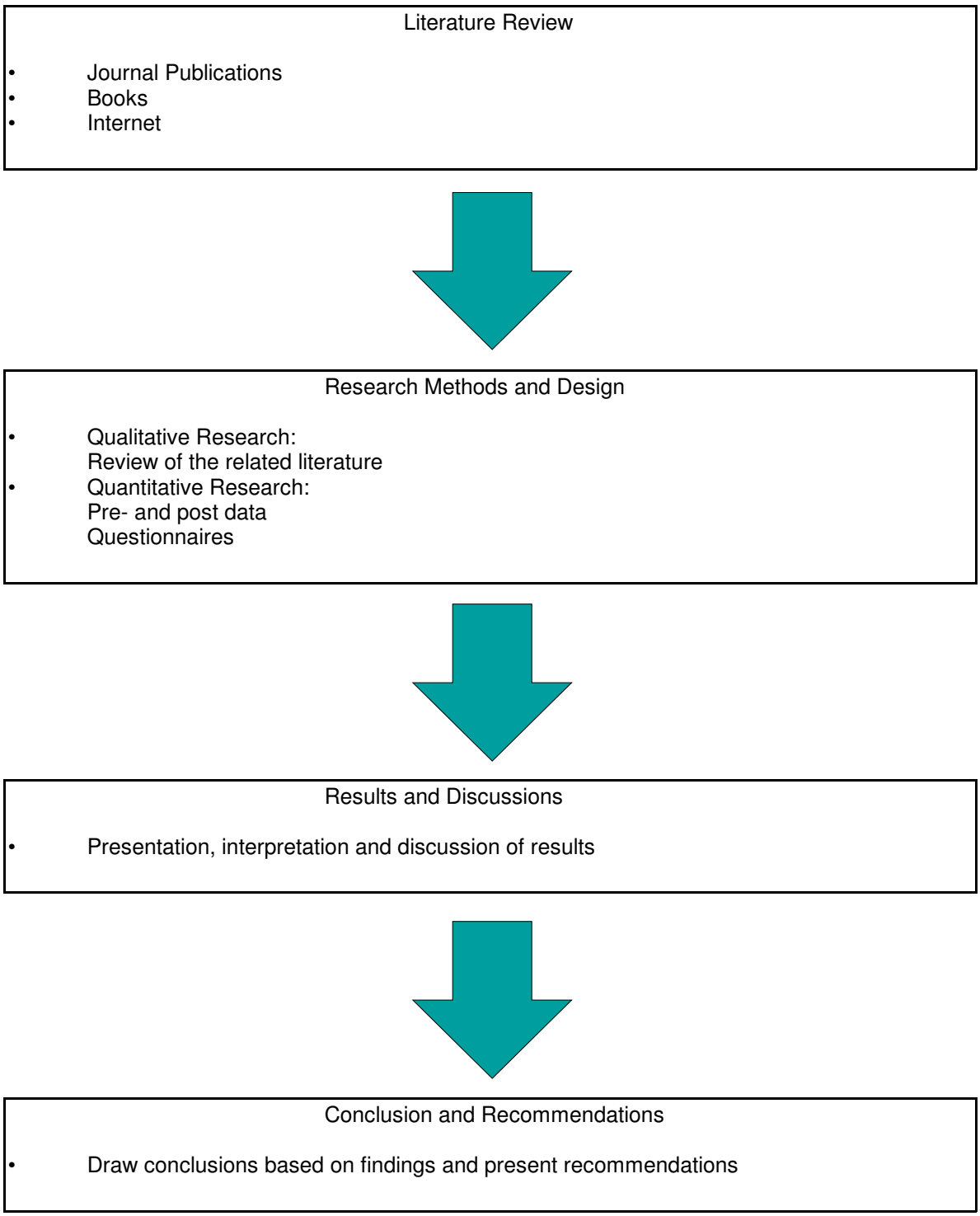
3.1 INTRODUCTION

This chapter provides an overview of the research methods that were used as well as the basis for the research design, data collection and data analysis for this study. The chapter closes with background information on the organisation as well as an overview of the production process which informs the preliminary and main survey of this research.

According to Jancowicz (2005:196), research design is described as “the deliberately planned arrangement of conditions for analysis and collection of data in a manner that aims to combine relevance to the research purpose with economy of procedure”. This is supported by Blumberg, Cooper and Schindler (2008:195) who suggest that the research design represents the blueprint for the collection, measurement and analysis of data. It can therefore be inferred that the choice of the most appropriate research design is not only an important step of the study but also key to its success.

The research process undertaken during this study is outlined in Figure 3.1 depicted on page 47:

Figure 3.1 Flow of Research Activities



Thus, Figure 3.1 presents the flow of research activities adopted to conduct this study.

3.2 TYPES OF RESEARCH

According to Roberts (2007:16) research could be “open or exploratory in methodological design or apply strict procedures to test an hypothesis”. Birley and Moreland (1998:68) describe exploratory data analysis as a preliminary examination of the data carried out to establish whether there are any patterns that justify a detailed examination with more specialist techniques. In contrast, the formal study begins with a descriptive account of the existing situation followed by the hypothesis or research question. The purpose of the formal research design is to provide a valid representation of the existing state and to test the hypothesis or answer the research question presented (Blumberg, Cooper and Schindler, 2008:196). White (2003:24) indicates that there are two types of research: quantitative and qualitative, both of which were employed in this study.

3.3 QUANTITATIVE RESEARCH METHODS

Leedy and Ormrod (2005:94) suggest that quantitative research is used to answer questions about relationships among measured variables with the aim of explaining, predicting, and controlling phenomena (traditional, experimental, or positivist approach). Blaxter, Hughes and Tight (2006:64) suggest that this generally involves relatively large-scale and representative sets of data.

Quantitative research methods include descriptive, experimental and ex-post facto research designs. Descriptive research involves either identifying the characteristics of an observed phenomenon or exploring possible correlations among two or more phenomena. This type of research involves examining a situation as it is and does not make any changes or modifications to the situation under investigation, nor does it attempt to determine cause and effect relationships. Descriptive research, which includes observation studies, correlation studies, developmental design and survey research, yields quantitative data that can be summarised through statistical analysis (Leedy and Ormrod, 2005:179). This study uses the descriptive research method to yield quantitative data with respect to the level of customer complaints pre- and post ISO 9001:2000 certification. This method is also used to ascertain whether there is

a link between ISO 9001:2000 certification and improved leadership, continuous improvement, and customer satisfaction.

3.4 QUALITATIVE RESEARCH METHODS

Walliman (2001:227) contends that natural science traditionally focussed on quantitative analysis. This approach was adopted by the social sciences until its shortcomings in respect of quantifying subjective human feelings and emotions were highlighted. Thus, qualitative analytical methods were developed to more accurately represent the latter (Walliman, 2001:227).

Blaxter, Hughes and Tight (2006:64) state that qualitative research entails collecting and analysing information in as many forms, mainly non-numeric, as possible. Leedy and Ormrod (2005:94) are of the belief that qualitative research is used to answer questions about the complex nature of phenomena, usually with the purpose of describing and understanding it from the participants' perspective (interpretative, constructivist, or postpositivist approach). The latter is reinforced by Kelley (1999:28) who suggests that a qualitative study may be carried out in an organisation, for example, to determine the views of the employees regarding the future of the organisation, satisfaction with remuneration and benefits and perceived work conditions. According to Locke, Silverman and Spirduso (2004:149) qualitative research designs include ethnography, phenomenological study, grounded theory study, and case study. This research uses the case study approach which, according to Kelley (1999:29), may also contain quantitative information such as financial data and ratios.

3.5 THE CASE STUDY APPROACH

Case study research is incapable of providing a generalised conclusion because of its dependence on a single or small number of cases. However, it is argued that this is not the purpose or intent of case study research. Instead, it is aimed at gaining greater insight and understanding of the dynamics of a given situation in a selected organisation (Maree, 2007:76).

According to White (2003:39), the case study method is a wide-ranging study of a single situation such as an individual, family or organisation. In a case study, a specific individual, programme or event is studied in depth for a defined period of time. It is possible that researchers may focus on a single case because its unique or exceptional qualities promote understanding or informs practice for similar situations. A case study may be particularly useful for learning more about a poorly understood situation as well as for investigating an individual or programme changing over time as a result of certain circumstances or interventions. The case study approach is also of use for generating preliminary support for hypotheses (Leedy and Ormrod, 2005:135). Furthermore, Melville and Goddard (1996:4) contend that descriptive case study research is used to analyse a specific situation to determine whether it gives rise to any general theories or if it yields existing general theories.

Patton and Appelbaum (2003:66-67) indicate that case studies involve conducting a series of activities in the following sequence. It begins with defining the objective of the study broadly in order to accommodate possible adjustments that may become necessary as the study progresses. A key to the success of this approach lies in the strategic selection of an appropriate case that permits an in-depth investigation. This is followed by the use of current literature to build theory in support of the study objective and to establish validity in the research. Lastly, it is necessary to decide on instruments and procedures for collecting, analysing and interpreting the data collected in order to reach conclusions.

Garson (2002:1) cite the work of Jensen and Rodgers (2001) who present a typology of case studies as follows:

- Snapshot case studies: involve detailed, objective study of one research entity at one point in time. Hypothesis testing by comparing patterns across sub-entities.

- Longitudinal case studies: entail quantitative and/ or qualitative study of one research entity at multiple time points.

- Pre-post case studies: require the study of one research entity at two time points separated by a critical event. A critical event is one which on the basis of a theory under study would be expected to impact case observations significantly.

- Patchwork case studies: represent a set of multiple case studies of the same research entity, using snapshot, longitudinal and/ or pre-post designs. This multi-design approach is intended to provide a more holistic view of the dynamics of the research project.

- Comparative case studies: necessitates the analysis of a set of multiple case studies of multiple research entities for purposes of cross-unit comparison. Both qualitative and quantitative comparisons are generally made.

The case study approach is the most appropriate description of the research method being used to conduct an in-house investigation at a selected manufacturing organisation. Based on the above descriptions, a combination of the snapshot and pre-post methodological paradigm will be used for this study. The pre-post case study applies in respect of the investigation of the level of customer complaints before and after ISO 9001:2000 certification while the snapshot case study best describes the use of questionnaires to determine employees' perceptions of the effectiveness of ISO 9001:2000 certification in respect of enhanced customer satisfaction, leadership and continuous improvement.

3.6 MIXED METHOD RESEARCH

There are sound reasons for the planned use of more than one method during the study. The process where two or more methods are used, in order to verify the validity of the information being gathered, is referred to as triangulation (Blaxter, Hughes and Tight, 2006:84-86).

There are different types of triangulation being practiced by researchers. If the problem being studied is subjected to both qualitative and quantitative methods, this

is referred to as method triangulation. Comparison of the results are likely to yield substantially more information about the research topic under investigation. The overall argument is strengthened if results from the different methods lead to the same inferences. If the same method of data gathering is from different sources, and over different time-scales, this is usually referred to as data triangulation. Finally, theoretical triangulation occurs when the theory of one academic discipline is applied to a research problem within another discipline (White, 2003:67).

Method triangulation is used in this study and is achieved through the use of qualitative and quantitative methodologies. The literature review and open-ended questions from the questionnaire represent the qualitative methodology while the customer complaints data, closed-ended questions and subsequent statistical data represent the quantitative methodology.

3.7 TARGET POPULATION FOR THE STUDY

Since the target respondents in the organisation only equated to fifty-two, the entire group of the identified target respondents formed the elements for the empirical study. The survey method was used to administer the questionnaire and the researcher was present to address queries. Thirty-one of the fifty-two employees of the selected organisation answered the questionnaire. This represents a 60% response rate.

3.8 ETHICAL CONSIDERATIONS FOR COLLECTING DATA

A letter of informed consent (refer to Annexure A) to conduct the study was obtained from the selected organisation on the proviso that the name of the organisation and its products as well as its customers and suppliers were not mentioned in the study. Data gathering in any organisation has ethical and legal implications. According to Kelley (1999:83-84) the main ethical considerations in this regard are to obtain informed consent and protect the confidentiality of the survey respondents. Informed consent was obtained to conduct the study by ensuring that each respondent signed a statement (letter accompanying questionnaire - refer to Annexure B) indicating awareness of the study, willingness to participate and confidentiality of responses.

3.9 TYPES OF DATA

It is important to distinguish between primary and secondary data when conducting research. The differentiation between these is based on the source from which the data is obtained, ie. primary and secondary sources (Walliman, 2001:198).

3.9.1 PRIMARY DATA

Bless and Higson-Smith (2000:156) indicate that primary data refer to data collected with the main aim of answering the research question presented by the researcher. Primary data are sought for their closeness to the truth and control over error. The probability of error is reduced due to the immediacy of the data collected by the researcher (Blumberg, Cooper and Schindler, 2008:75). Questionnaires were used to obtain responses from the employees of the organisation with respect to the effectiveness of ISO 9001:2000 quality management standard.

Data from primary sources can be in the inanimate form of instrumental readings, results of counting and measuring, physical artefacts or in the animate form such as reports of direct observations of events or conditions, or recordings of experiences by those involved, and documents such as minutes of meetings (Walliman, 2001:198).

Maree (2007:82), contends that when documents are used as a data gathering technique, the researcher focuses on all types of written communication that may shed light on the phenomenon being investigated. It is also suggested that primary sources are data that is unpublished and which the researcher has gathered from the organisations directly such as minutes of a meeting, reports, and correspondence.

In this study, the organisation's recorded production data was used to determine the total output produced per month. The monthly output documentation and correspondence on quality problems between the Quality Assurance Manager and International Sales Representatives makes up the primary data. The International Sales Representatives receive queries and/or complaints from customers which they then forward to the Works and Quality Assurance Managers at the manufacturing

plant for explanations and remedial action.

The number of customer complaints received per month and the production output per month was used to determine a ratio of customer complaints against production output. This measure was used to track performance in terms of customer complaints per thousand tons of product on a monthly basis for the periods 2000 to 2004 (pre-ISO 9001:2000 certification) and 2005 to 2008 (post ISO 9001:2000 certification). This data will then be subjected to a comparative t-test for independent samples to establish whether any significant change has occurred with respect to the level of customer complaints pre- and post ISO 9001:2000 certification.

3.9.2 SECONDARY DATA

According to Bless and Higson-Smith (2000:156), secondary data refers to data used in a specific study although collected by a different researcher for the purpose of dealing with a different research problem. Blumberg, Cooper and Schindler (2008:75) suggest that secondary data have had at least one level of interpretation inserted between the event and its recording. Data that have been subjected to interpretation are referred to as secondary sources. The most common form of secondary source is writings in books, newspaper reports, articles and other publications (Walliman, 2001:198).

The current research problem being studied comprises secondary data in the following forms: a literature search to determine the most recent developments in this field which required the use of related textbooks, journals and the internet and consultation with the Quality Manager of the organisation in which the research was being conducted in order to obtain background information on the organisation and its processes.

3.10 SOURCES OF DATA

According to Mouton (2001:99) data sources can be classified into several categories. Examples of each category are presented in Table 3.1 below:

Table 3.1 Sources of Data

Category	Examples
Observation	Systematic observation under controlled experimental or laboratory conditions. Participant observation in natural field settings.
Self-reporting	Personal and group face-to-face interviewing. Telephone interviewing. Mail and electronic surveys.
Archival/ documentary sources	Historical documents, diaries, letters, speeches, literary texts, narratives, official memoranda, business plans, annual reports, medical records, etc.
Physical sources	Blood samples, cell tissue, chemical compounds, materials, etc.

Source: Mouton (2001:99).

This study involved the use of self-reporting through the completion of questionnaires by employees of the organisation and archival/documentary sources to obtain information pertaining to customer complaints and production tonnages for the periods pre- (2000-2004) and post (2005-2008) ISO 9001:2000 certification.

3.11 DATA COLLECTION TECHNIQUES

The basic principles of data collection have to be heeded by the researcher if the results of the study are to be useful. Firstly, the method chosen has to generate data that is relevant to the research question. The second principle relates to the relative ease of use and convenience of the technique in the circumstances as well as the

justification for the expenditure of time and resources on the study. Finally, the matters of validity and reliability of the techniques used have to be taken into consideration (Birley and Moreland, 1998:41). According to Mouton (2001:99) data collection techniques include interviews, observation, documents and questionnaires.

3.11.1 DOCUMENTS

The majority of research studies involve the use and analysis of documents to varying degrees. According to Blaxter, Hughes and Tight (2006:167) documents may:

- be library based which is directed at producing a critical outline of a current area of research writing;
- be computer based which consists largely of the analysis of previously accumulated sets of data;
- be work-based which draws on materials generated within an organisation;
- have a focus on policy through analysing materials relevant to a particular set of policy decisions; or
- have a historical orientation which utilises available archival and other supporting documentary evidence.

The data collected for the initial part of the empirical investigation for the current study are from work-based documents that are generated within the organisation.

3.11.2 QUESTIONNAIRES

Questionnaires are one of the most broadly used social research techniques. This is a strategy used to elicit the responses or experience of a unit or group through the development of precise written questions. It is contended, however, that developing a questionnaire and attempting to interpret the responses to qualitative questions in particular, is no simple task (Blaxter, Hughes and Tight, 2006:179).

Questionnaires yield data in a very systematic and ordered fashion. The responses to the questions may be quantified, categorised and subjected to statistical analysis.

The researcher designs closed-ended questions where basic responses are required and open-ended questions to elicit the respondents' opinions. Questionnaires may be sent via e-mail and completed online, sent and returned by postal mail or dropped off and picked up at a later date by the researcher (White, 2003:50-52).

The questionnaire designed for this study utilised a five-category Likert Scale. According to Kelley (1999:95) the Likert Scale is classified as a rating scale which has numbers associated with sub-statements. An example of the Lickert Scale is shown below:

Figure 3.2: Example of Likert Rating Scale

1	2	3	4	5
Agree	Disagree	Neither agree nor disagree	Agree	Strongly agree

Questionnaires containing open-ended questions were used to collect qualitative data. It is recommended that such questions be used sparingly because they are inclined to reduce response rates and are time consuming to analyse (Kelley, 1999:32).

For this study, questionnaires were handed to employees of the organisation (refer to Annexure C for sample of questionnaire). The questionnaire comprised a combination of closed-ended questions and open-ended questions in order to elicit responses with regard to their perceptions of the effectiveness of the ISO 9001:2000 quality management standard. The open-ended questions also served as backup questions for certain closed-ended questions.

3.12 RESULTS OF THE INVESTIGATION INTO THE LEVEL OF CUSTOMER COMPLAINTS PRE- AND POST ISO 9001:2000 CERTIFICATION

This section presents the findings of the study with respect to the level of customer complaints before and after ISO 9001:2000 certification. Customer complaints and production output data were obtained for the period 2000 to 2004 (before certification) and 2005 to 2008 (after certification).

3.12.1 ANALYSIS OF CUSTOMER COMPLAINTS DATA PRE- ISO 9001:2000 CERTIFICATION

Table 3.2 presents the customer complaints and production data for the period prior to ISO 9001:2000 certification.

Table 3.2 Customer Complaints and Production Data - (2000 to 2004)

Year	000' Tons	Number of Complaints	Complaints per 000' Tons
2000	35.658	13	0.365
2001	37.961	13	0.342
2002	42.183	8	0.190
2003	43.380	2	0.046
2004	43.740	2	0.046
		38	

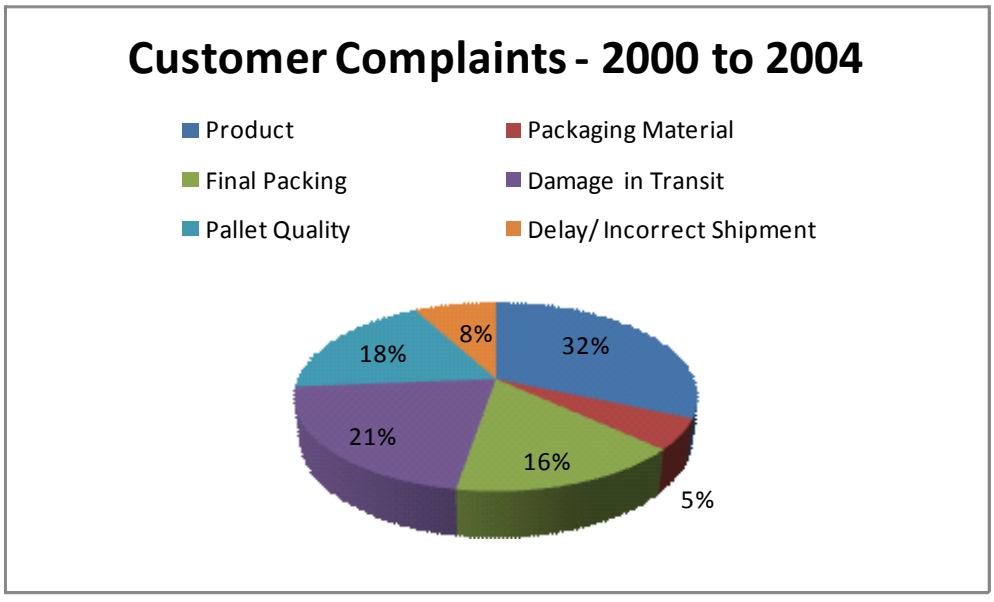
Table 3.2 shows that a total of 38 customer complaints were received by the organisation for the period 2000 to 2004. Table 3.3 on page 59 provides an analysis of the complaints by category for this period.

Table 3.3 Customer Complaints by Category - (2000 to 2004)

Complaint Category	Number of Complaints	Percentage
Product	12	32 %
Packaging Material	2	5 %
Final Packing	6	16 %
Damage in Transit	8	21 %
Pallet Quality	7	18 %
Delay/Incorrect Shipment	3	8 %
	38	**100 %**

Figure 3.3 below highlights the main problem areas identified following the analysis of the customer complaints received by the organisation as shown in Table 3.3 above.

Figure 3.3 Customer Complaints for Period 2000 to 2004



It is evident that most of the customer complaints were related to product quality (32%), pallet quality (18%), damage during shipping (21%) and defects that can be traced back to the final packing process (16%).

Information obtained from the analysis of customer complaints data for the period 2000 to 2004 (prior to ISO 9001:2000) certification was used to help inform the design of certain aspects of the questionnaire. This included incorporating questions pertaining to use of the process approach to improve product quality, customer complaints handling, supplier management and employee development.

3.12.2 ANALYSIS OF CUSTOMER COMPLAINTS DATA POST ISO 9001:2000 CERTIFICATION

Table 3.4 highlights the customer complaints and production data for the period following ISO 9001:2000 certification.

Table 3.4 Customer Complaints and Production Data - (2005 to 2008)

Year	000' Tons	Number of Complaints	Complaints per 000' Tons
2005	43.267	1	0.023
2006	35.780	3	0.084
2007	40.254	3	0.074
2008	29.543	2	0.068
		9	

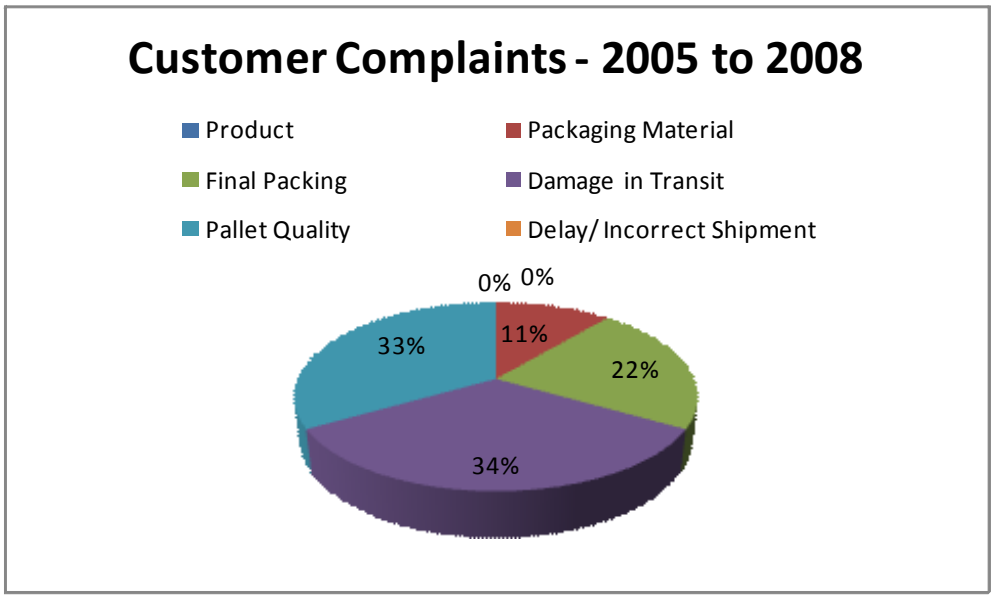
Table 3.4 shows that a total of 9 customer complaints were received post ISO 9001:2000 certification for the period 2005 to 2008. This represents a significant decrease when compared to the 38 customer complaints received pre- ISO 9001:2000 certification for the period 2000 to 2004. Table 3.5 on page 61 provides an analysis of the complaints by category for this period.

Table 3.5 Customer Complaints by Category - (2005 to 2008)

Complaint Category	Number of Complaints	Percentage
Product	0	0 %
Packaging Material	1	11 %
Final Packing	2	22 %
Damage in Transit	3	34 %
Pallet Quality	3	33 %
Delay/ Incorrect Shipment	0	0 %
	9	**100 %**

Figure 3.4 below highlights the main problem areas identified following analysis of the customer complaints received by the organisation as shown in Table 3.5 above.

Figure 3.4 Customer Complaints for Period 2005 to 2008



It is notable from analysis of the results (Figure 3.4) that product quality problems and incorrect or delays in shipment show a significant improvement when compared to results obtained for the period pre- ISO 9001:2000 certification. The results shown in

Table 3.5 and Figure 3.4, however, indicate that damage during shipment (34%), pallet quality (33%) and defects associated with the final packing process (22%) continue to be of concern, albeit at a lower level in terms of the number of complaints received.

3.13 RELIABILITY OF RESEARCH DESIGN

Reliability is an important attribute that any data collecting instrument has to possess. Reliability is the extent to which a test would give consistent results if utilised more than once on the same individual, group or system under standard conditions (Birley and Moreland, 1998:43).

Cronbach's Alpha was used to measure the reliability of the questionnaire administered to the employees. Mathematically, reliability is defined as the proportion of the variance in the responses to the survey that is the result of difference in perceptions of the respondents. It is also contended that a reliability coefficient of 0.70 or higher is considered acceptable in most social science research studies, (http://www.ats.ucla.edu/stat/Spss/faq/alpha.html, 05-10-09).

3.14 HYPOTHESIS TESTING

Observations or data can be interpreted by developing hypotheses or theories that explain observed patterns and trends in the data. Interpretation means associating the results and findings of the study to existing theoretical frameworks or models, and showing whether these are supported or proven to be false by the new interpretation (Mouton, 2001:109).

A statement of the hypotheses for the problem being researched were as follows:

H1 - There is a significant relationship between ISO 9001:2000 certification and marketing as a motive for implementation.

H2 - There is a significant relationship between ISO 9001:2000 certification and

increased customer satisfaction.

H3 - There is a significant relationship between ISO 9001:2000 certification and enhanced leadership.

H4 - There is a significant relationship between ISO 9001:2000 certification and continuous improvement.

H5 - There is a significant relationship between ISO 9001:2000 certification and the use of ISO 9004 to improve performance

H6 - There is a significant difference in the level of customer complaints pre- and post ISO 9001:2000 certification.

Graziano and Raulin (1997:178) believe that an important part of research is the developing and testing of hypotheses. Furthermore, they indicate that “the research hypothesis is a specific prediction about the effects of the specific, operationally defined independent variable on the specific, operationally defined dependent variable” (Graziano and Raulin, 1997:178).

This is reinforced by Goddard and Melville (2006:69) who contend that the formulation of hypotheses is a fundamental principle in the scientific method and the purpose of a hypothesis is to predict a relationship between variables that can be tested. The hypothesis, once formulated, can be accepted or rejected on accumulation and analysis of the data.

An essential part of any empirical analysis is to analyse the large collection of raw data into meaningful information. There are many reasons for analysing data which include testing hypotheses, forecasting, making comparisons, measuring and examining relationships (Walliman, 2001:253). The statistical tests conducted in this study are elaborated overleaf:

3.14.1 CHI-SQUARE TEST

The responses to the questionnaires administered in this study were subjected to chi-square testing. The latter can be used to test for significant differences between the observed distribution of data for the options per statement within each category and the expected distribution based on the null hypothesis. A null hypothesis is established based on the expected frequencies for options per statement within each category. The distributions of the actual frequencies for the options per statement within each category are then compared with the hypothesised frequencies. The greater the difference between actual and expected frequencies, the lower is the probability that these differences can be attributed to chance (Blumberg, Cooper and Schindler, 2008:759-760).

According to Willemse (2009:209), a chi-square test is any statistical hypothesis test in which the test statistic has a chi-square distribution when the null hypothesis is true. The null hypothesis states that there is no difference between the expected frequencies for the options per statement within each category. The alternate hypothesis indicates that there is a difference. A significant result is indicated when $p < 0.05$ which implies that null hypothesis is rejected and the alternate hypothesis is satisfied.

3.14.2 T-TEST FOR INDEPENDENT SAMPLES

The customer complaints data that were obtained pre- and post ISO 9001:2000 certification were subjected to a t-test for independent samples to establish whether there is any significant difference in the means. Welman and Kruger (2002:213) indicate that t-tests are parametric tests used to test hypotheses or to test for significance. This test enables the researcher to determine whether two groups have equivalent or different mean scores. Furthermore, they point out that the t-test is used to determine whether an observed difference in the means of two groups is sufficiently large to be ascribed to a change in some variable or that it could have taken place by chance. Lind, Marchal and Mason (2004:347) concur that the independent t-test is the most suitable parametric test for a comparison of means.

The traditional approach to reporting an outcome in this regard requires a statement of statistical significance. If the test result yields a p-value ($p < 0.05$), then it is considered to be a significant result (Lind, Marchal and Mason, 2004:347).

3.15 OVERVIEW OF THE SELECTED MANUFACTURING ORGANISATION

Informed consent has been obtained from Management of the selected organisation to undertake this study on condition that details pertaining to the organisation, its products, suppliers and customers are not disclosed. The organisation selected for this study is located at Merebank, south of Durban, in Kwazulu-Natal. According to the selected organisation's Quality Assurance Manual (1999:4), it is part of a diversified, international chemical and health care organisation with operations in 150 countries. Its international operations include the following sectors: polymers, organic products, industrial products, health care, agrochemicals and imaging technologies. The organisation being studied manufactures and supplies chrome related products.

The manufacture of chrome tanning salts involves the reduction of a chrome derivative through the use of a reducing agent to yield an intermediate product, chrome tanning salt liquor. This intermediate is further processed to yield the final product, chrome tanning salt powder. The final product is diverted to either the bagging machines for packing or to the product bin where it is stored for subsequent use in the production of related products (selected organisation's Quality Procedures Manual, 1999:3-5).

The bags are filled with product automatically and are weighed simultaneously (online electronic scales). Bags with weights that fall within the specified weight range are palletised automatically and each fully loaded pallet is then covered with shrouds of shrinkwrap to prevent movement of the bags during shipment. A hyster is used to transport the fully loaded pallet into a storage area where it stands temporarily until it has to be loaded into a container as part of an order to be shipped out to one of the organisation's many international customers (selected organisation's Quality Procedures Manual, 1999:6-7).

3.16 SUMMARY

This chapter provided an overview of the research methods available as well as detail on the case study approach as the selected research method. Information was also presented on the types, sources and techniques for collection of data in this study. Data from the pre- and post ISO 9001:2000 study was analysed with the results being used to inform aspects of the questionnaire design. The hypotheses were formulated and the statistical tests of significance were decided upon. The chapter was concluded with information on the organisation background together with an overview of its production process.

In chapter four the data collected through the use of questionnaires will be subjected to statistical analysis and interpretation using the Statistical Programme for Social Sciences (SPSS) version 17 for Windows and Statgraphics Centurion 15.1. A discussion of the findings of the study will be followed by the relevant statistical tests of significance.

CHAPTER 4

ANALYSIS OF RESULTS AND DISCUSSION OF FINDINGS

4.1 INTRODUCTION

This chapter reviews the results of the study carried out in the selected organisation. This includes discussion of the results of the questionnaire that was administered to employees of the organisation and customer complaints data that was collected pre- and post ISO 9001:2000 certification by the organisation. The reliability of the questionnaire was determined as was the communality of the questions that made up each category of the questionnaire.

4.1.1 RELIABILITY OF QUESTIONNAIRE

The questionnaire was tested for reliability using Cronbach's Alpha Coefficient post survey and was deemed to be reliable with an overall score of 0.70. A reliability coefficient of 0.70 or higher is regarded as acceptable in most social science research situations (http://www.ats.ucla.edu/stat/Spss/faq/alpha.html, 05-10-09). The category and overall reliability scores are shown in Table 4.1 on page 68:

Table 4.1 Category and Overall Reliability Scores

Category	Cronbach's Alpha Score
Motive for ISO certification	0.818
Effectiveness of ISO 9001:2000 with respect to determining and handling customer complaints	-
Effectiveness of ISO 9001:2000 with respect to ensuring customer satisfaction	0.697
Effectiveness of ISO 9001:2000 with respect to ensuring leadership	0.705
Effectiveness of ISO 9001:2000 with respect to continuous improvement	0.665
Use of ISO 9004 to improve performance	0.828
Overall	0.700

The category pertaining to employees perceptions of the effectiveness of ISO 9001:2000 with respect to determining and reducing customer complaints did not produce a result as there were too many constants within the factors.

4.1.2 COMMUNALITY CATEGORIES WITHIN QUESTIONNAIRE

The completed questionnaires were also analysed in terms of communality. Communality may be interpreted as the proportion of variance of the variable that is accounted for by all the factors taken together. A very low communality indicates that a variable may not belong with any of the factors that make up the category, (http://www.ats.ucla.edu/stat/Spss/whatstat/whatstat.htm,05-10-09). The result of the assessment that was made of the communality for each category and the questionnaire overall is shown in Table 4.2 on page 69:

Table 4.2 Category and Overall Mean Communality Scores

Category	Communality Score
Motive for ISO certification	0.86
Effectiveness of ISO 9001:2000 with respect to determining and handling customer complaints	0.72
Effectiveness of ISO 9001:2000 with respect to ensuring customer satisfaction	0.71
Effectiveness of ISO 9001:2000 with respect to ensuring leadership	0.83
Effectiveness of ISO 9001:2000 with respect to continuous improvement	0.79
Use of ISO 9004 to improve performance	0.77
Overall	0.79

The ideal would be to obtain values of close to 1.0 which would indicate that the model explains most of the variation for the variables that make up each category of the questionnaire. The individual communalities indicate how well the model is working for the individual variables, and the total communality gives an overall assessment of performance. In this case, the model is good as it accounts for 79% of the variation for the variables in the communality tables.

4.1.3 BASIS FOR ANALYSIS OF RESULTS AND HYPOTHESIS TESTING

A brief explanation of the basis for measuring the responses to the questionnaire as well as hypothesis testing precedes the discussion of results.

4.1.3.1 BASIS FOR MEASURING QUESTIONNAIRE RESPONSES

The Likert Scale is the most often used variation of the summated rating scale. Summated scales are made up of statements that convey either a favourable or

unfavourable attitude towards the object of interest. The respondent is required to agree or disagree with each statement with each response being given a numerical score to reflect its attitudinal favourableness (Blumberg, Cooper and Schindler, 2008:467). The questionnaire that was administered in this study used the Likert Scale and required respondents to score the variables being investigated on a scale of one to five. A score of five indicated maximum agreement and a score of one suggested strong disagreement with the statements presented in the questionnaire. Mean scores were obtained by determining the average score of the responses for each statement and category.

4.1.3.2 HYPOTHESIS TESTING

The traditional approach to report a result requires a hypothesis test or statement of statistical significance. Chi-square tests were performed to determine whether there was a statistically significant difference in the frequencies per option for each question within the different categories. A chi-square test is any statistical hypothesis test wherein the test statistic has a chi-square distribution when the null hypothesis is true (Willemse, 2009:209). A p-value is generated from a test statistic and a significant result is indicated with $p < 0.05$. A p-value > 0.05 indicates that there is no difference in expected frequencies and a p-value < 0.05 is indicative of a difference in terms of the frequencies per option for each question, and that any difference is not due to chance.

4.1.4 SEQUENCE OF PRESENTATION OF RESULTS

The results of the study are presented in the following categories as shown in Table 4.3 on page 71. The table shows the sequence of presentation of sections A to F of the questionnaire that was administered and section G which pertains to the customer complaints data collected pre- and post ISO 9001:2000 certification.

Table 4.3 Sequence of Presentation of Results

A	4.2.1	Motive for obtaining ISO certification
B	4.2.2	Level of effectiveness of ISO 9001:2000 with respect to determining and reducing customer complaints
	4.2.3	Level of effectiveness of ISO 9001:2000 with respect to ensuring customer satisfaction
C	4.2.4	Level of effectiveness of ISO 9001:2000 certification with respect to enhancing leadership
D	4.2.5	Level of effectiveness of ISO 9001:2000 certification with respect to continuous improvement
E	4.2.6	Use of ISO 9004:2000 to improve organisational performance
F	4.2.7	Extent of use of business improvement approaches
G	4.2.8	Customer complaints data pre- and post ISO 9001:2000 certification

4.2 ANALYSIS AND DISCUSSION OF FINDINGS AND HYPOTHESIS TESTING

The findings of each section of the questionnaire are shown below along with the corresponding hypothesis test result. The graphs below indicate the mean scores in addition to the gap for each question within each category. A gap was determined for each variable by finding the difference between the mean variable score and the score for maximum agreement. Generally, a gap of two or more indicates a major difference between the actual and perceived scores.

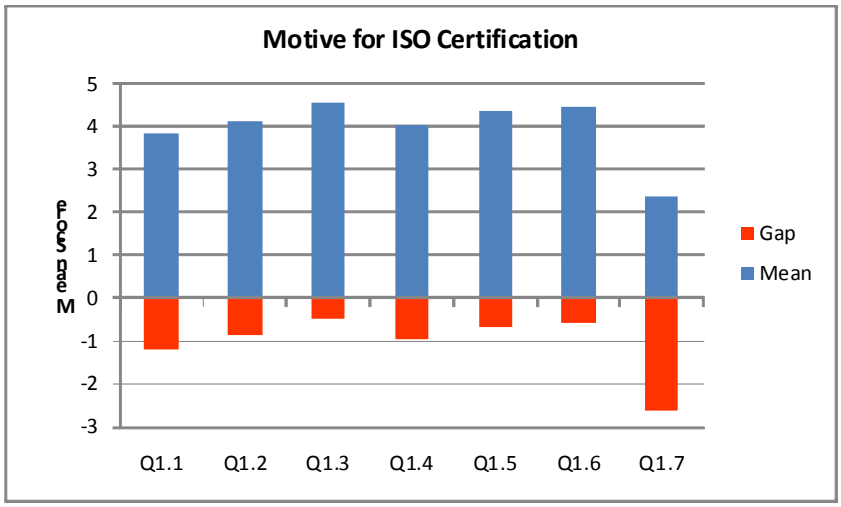
4.2.1 SECTION A: MOTIVE FOR OBTAINING ISO 9001:2000 CERTIFICATION

This section deals with the results of the questionnaire on employee's perceptions of the reasons for the organisation obtaining ISO certification. The section is concluded with the hypothesis test result.

4.2.1.1 ANALYSIS OF RESULTS AND DISCUSSION OF FINDINGS

Analysis of the responses to the questionnaire are shown in Figure 4.1 below and the discussion of findings follows.

Figure 4.1 Motive for Obtaining ISO Certification (n=31)



The individual scores for each of the questions within this category are shown in Table 4.4 on page 73:

Table 4.4 Mean Individual and Hypothesis Test Scores for Motive for Obtaining ISO Certification (n=31)

1. ISO 9001:2000 certification was obtained:	Mean Score	p-value
1.1 strictly as a customer requirement	3.8	0.020
1.2 to improve market opportunities	4.1	0.000
1.3 as an initiative to improve quality in the organisation	4.5	0.590
1.4 to increase productivity in the organisation	4.0	0.040
1.5 to reduce costs in the organisation	4.3	0.010
1.6 to improve customer satisfaction	4.4	0.006
1.7 in order to qualify for government, and other tenders	2.4	0.000

The overall average of the scores depicted in Table 4.4 with respect to the motive for obtaining ISO certification is 4.0 with a gap of 1.0 indicating overall agreement for this category.

For question 1.1: the result mean score (3.8) with respect to obtaining ISO certification strictly as a customer requirement indicates that more respondents "agreed" with the statement than those who "disagreed". Douglas, Coleman and Oddy (2003:317) cite the work of Witcher (1993) and Taylor (1995) who claim that certain organisations prefer to deal with suppliers who are ISO 9001 certified and may even resort to making this a requirement to be included on their value chain. This view is supported by Meredith and Shafer (2002:80) who indicate that, as early as 1993, the European Community required that organisations in several industries become ISO certified as a condition of carrying out business in Europe. The organisation in which this research has been carried out exports its product to many parts of the world including countries that belong to the European Union, perhaps making ISO certification necessary. In contrast, this situation is deemed unacceptable by Seddon (2004:34) who suggests the existence of marketplace coercion. Perhaps this practice of forcing organisations to seek ISO certification can be viewed as unethical since organisations that produce high quality products despite not being ISO certified are unfairly disadvantaged in this process.

For question 1.2: the mean score (4.1) indicates that the respondents “agreed” with the statement that ISO 9001 certification was obtained in order to improve market opportunities. Organisations that are ISO 9001 certified could benefit through improved market opportunities, possibly because potential customers perceive them to be associated with superior quality products. This is demonstrated by the findings of Terziovski, Samson and Dow (1997), cited by Martinez-Costa and Martinez Lorente (2003:1189), who found that ISO 9001 certification opened previously closed doors to the market. This view, however, is criticised by Joubert (1998:63) who argues that an organisation that is more interested in improving its marketing image than its long term quality strategy will not gain all the potential benefits of ISO 9001 certification. It can be inferred that the use ISO 9001 certification purely as a marketing strategy without paying due attention to product quality could lead to the organisation failing to sustain this practice in the long term.

For question 1.3: obtaining ISO 9001 certification in order to improve quality was an aspect that the respondents with a mean score (4.5) “agreed” with. According to Meredith and Shafer (2002:58), high levels of quality tend to protect the organisation from competition, who may have to sell their products at significantly lower prices and margins to compete for market share. This is especially significant in the organisation in this study because it competes globally. Competitiveness and sustainability of the organisation could most probably be achieved through quality improvements such as the ISO 9001 quality management standard.

For question 1.4: the result mean score (4.0) with respect to ISO 9001 certification being sought to improve productivity indicates that the respondents “agreed” with the statement. Meredith and Shafer (2002:59) suggest that improvements in quality usually lead to increased productivity as is demonstrated by many Japanese organisations. The ISO 9001:2000 standard requires that all work procedures be documented and displayed at the workplace probably ensuring that effective work methods are standardised as the only way to carry out the work thus contributing to higher levels of productivity.

For question 1.5: the respondents “agreed”, with a mean score (4.3), that ISO 9001

certification was obtained in order to reduce costs. The ISO 9001 standard seeks to build quality at every stage of the organisation's activities thereby reducing the costs of quality associated with waste, rework and defects (Barnes, 2008:289). The latter implies that the existence of a quality management standard should in all probability lead to more efficient operation of an organisation.

For question 1.6: obtaining ISO 9001 certification in order to improve customer satisfaction was an aspect that the respondents with a mean score (4.4) "agreed" with. According to Krajewski and Ritzman (2005:196), customers are satisfied when their expectations of a product or service are met or exceeded. Notably, the ISO 9001:2000 standard requires that customer requirements be determined and met which probably leads to improved customer satisfaction.

For question 1.7: the result mean score (2.4) indicates that the respondents "disagreed" that ISO certification was obtained in order to qualify for tenders. This is contrary to the findings of Dissanayaka, Kumaraswamy, Karim and Marosszeky (2001:37) who discovered that the principal motivator behind ISO 9001 certification among Hong Kong constructors was to qualify them on public works tender lists. The response obtained in this regard could be attributed to the organisation under study not generally tendering for business.

4.2.1.2 HYPOTHESIS TESTING

H1 - There is a significant relationship between ISO 9001:2000 certification and marketing as one of the motives for implementation.

A statistically significant result is obtained with p-values < 0.05 (highlighted in green in Table 4.4). The Chi-square test for the statement that ISO 9001:2000 certification was obtained to improve marketing opportunities resulted in a p-value ($p < 0.05$) which implies that the alternate hypothesis (H1) claim that marketing is one of the motives for obtaining ISO certification is satisfied.

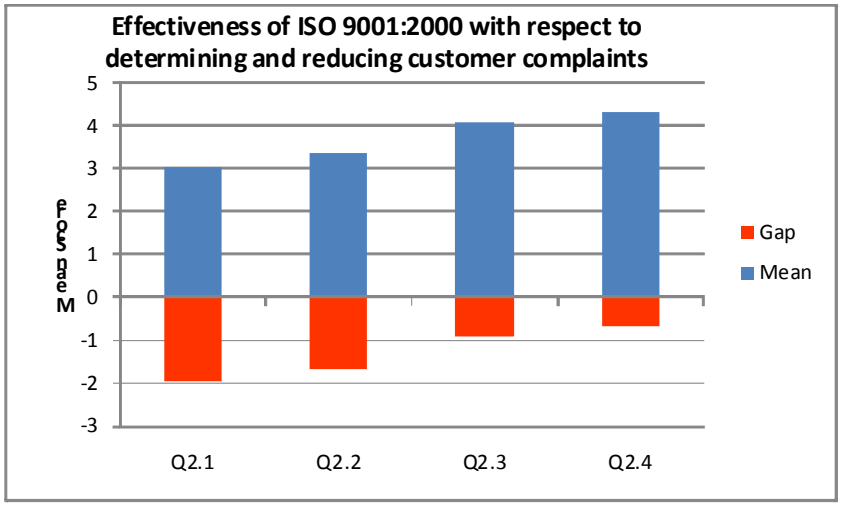
4.2.2 SECTION B: LEVEL OF EFFECTIVENESS OF ISO 9001:2000 WITH RESPECT TO DETERMINING AND REDUCING CUSTOMER COMPLAINTS

This section includes a discussion on the effectiveness of the ISO 9001:2000 standard in respect of determining and reducing customer complaints as well as the organisation's approach to ensuring customer satisfaction.

4.2.2.1 ANALYSIS OF RESULTS AND DISCUSSION OF FINDINGS

The first category in this section deals with the employees' perceptions of the effectiveness of the ISO 9001:2000 standard with respect to determining and reducing customer complaints. Analysis of responses to the questionnaire are shown in Figure 4.2 and the discussion of findings follows.

Figure 4.2 Effectiveness of ISO 9001:2000 with Respect to Determining and Reducing Customer Complaints (n=31)



The individual scores for each of the questions within this category are shown in Table 4.5 on page 77:

Table 4.5 Mean Individual and Hypothesis Test Scores with Respect to Determining and Reducing Customer Complaints (n=31)

2. Complaints from the customer	Mean Score	p-value
2.1 is the only form of external feedback to the organisation regarding product quality	3.0	0.000
2.2 include non-conformities reported by internal customers	3.3	0.106
2.3 are actively encouraged by the organisation	4.1	0.000
2.4 have decreased in the period following ISO 9001:2000 certification	4.3	0.002

The average of the scores depicted in Table 4.5 with respect to determining and reducing customer complaints is 3.7 with a gap of 1.3.

For question 2.1: the mean score (3.0) with respect to customer complaints being the only form of external feedback regarding product quality indicates that there were as many respondents who “agreed” with the statement as there were those who “disagreed”. The large variation in responses could be due to lack of knowledge regarding the receipt and handling of customer complaints from outside the organisation.

For question 2.2: there were marginally more respondents with a mean score (3.3) who “agreed” than there were those that “disagreed” with the statement that complaints from the customer include non-conformities reported by internal customers. The variation in responses to this question could possibly be due to a misunderstanding of the concept of internal customers. Internal customers can be explained in an organisational context as follows: the product despatch department is a customer of the product packing department; the product packing department is a customer of the processing department; and the processing department is a customer of the material stores. Those respondents who did not embrace the concept of internal customers were most probably undecided or responded negatively in this regard.

For question 2.3: the respondents “agreed” with a mean score (4.1) that the organisation actively encourages complaints from the customer. Lindborg (2003:84) suggests that, “quality requires that complaints should not simply be tolerated but actively encouraged in order to hear the voice of the customer even when the message is not positive”. Thus, by encouraging feedback from customers, the organisation will probably be able to keep abreast of problem areas that could be attended to and addressed immediately.

For question 2.4: a positive response with a mean score (4.3) indicates that the respondents “agreed” with the statement that customer complaints have decreased in the period following ISO 9001:2000 certification. This finding is consistent with another aspect of this research investigation that determined the level of customer complaints pre- and post ISO 9001:2000 certification, the results of which are discussed later in the chapter.

For question 2.5: respondents were required to indicate what sources of information are used by the organisation in order to assess the level of customer satisfaction. The feedback from the respondents is varied and includes sources such as customer feedback; the April Star Online System; and the Sales Department. These results show that more than half (52%) of the respondents indicated that the source of information on customer satisfaction is through customer feedback while a small number made reference to the April Star Online System that is in operation in the organisation. This suggests that not all employees are aware of the integrated, online reporting system which probably explains the reason for the large variation in responses to question 2.1. of the questionnaire.

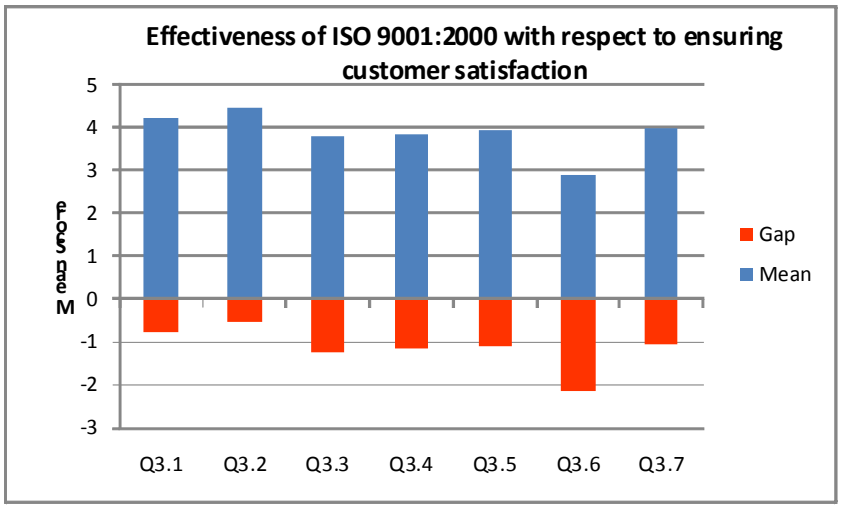
4.2.3 SECTION B: LEVEL OF EFFECTIVENESS OF ISO 9001:2000 WITH RESPECT TO ENSURING CUSTOMER SATISFACTION

The second category in this section deals with the employees' perceptions of the effectiveness of the ISO 9001:2000 standard with respect to ensuring customer satisfaction.

4.2.3.1 ANALYSIS OF RESULTS AND DISCUSSION OF FINDINGS

The analysis of responses to the questionnaire with respect to the level of effectiveness of ISO 9001:2000 in ensuring customer satisfaction are shown in Figure 4.3 below and the discussion of findings follows.

Figure 4.3 Effectiveness of ISO 9001:2000 with Respect to Ensuring Customer Satisfaction (n=31)



The individual scores for each of the questions within this category are shown in Table 4.6 on page 80:

Table 4.6 Mean Individual and Hypothesis Test Scores with Respect to Ensuring Customer Satisfaction (n=31)

3. The organisation strives to:	Mean Score	p - value
3.1 determine customer needs and expectations	4.2	0.002
3.2 communicate the importance of meeting customer needs and expectations throughout the organisation	4.5	0.857
3.3 communicate with customers to determine requirements	3.8	0.000
3.4 communicate with customers to receive feedback	3.8	0.000
3.5 use customer satisfaction data in the process of reviewing and improving the quality management system	3.9	0.000
3.6 make use of suppliers that are ISO 9001:2000 certified in an effort to improve quality of inputs into its processes	2.9	0.003
3.7 include its suppliers in quality improvement efforts	4.0	0.000

The overall average of the scores depicted in Table 4.6 with respect to ensuring customer satisfaction is 3.9 with a gap of 1.1.

For question 3.1: the respondents with a mean score (4.2) “agreed” with the statement that the organisation strives to determine customer needs and expectations. This is a significant result because Barnes (2008:279) is of the opinion that, “meeting customer requirements is essential if quality is to be managed successfully and so understanding customer requirements is a necessary pre-requisite if quality is to be managed successfully”. This is reinforced by Yusuf, Gunasekaran and Dan (2007:513) who are of the belief that organisations that understand customer needs and provide a product to meet these requirements are capable of gaining competitive advantage. Thus, it can be inferred that the determination of customer needs and expectations is crucial to the competitiveness and ultimate success of the organisation.

For question 3.2: the communication, throughout the organisation, of the importance of meeting customer needs and expectations is an aspect that the

respondents with a mean score (4.5) “agreed” with. West, Cianfrani and Tsiakals (2000:42) state that, “top management must communicate the importance of meeting customer and regulatory requirements which include ensuring that the needs and expectations of customers are understood, translated into internal requirements and met”. Thus, creating awareness among employees of the importance of meeting customer needs and expectations is perhaps a step in the direction of ensuring that internal processes and activities are accomplished adequately.

For questions 3.3, 3.4 and 3.5: the result regarding communication by the organisation with customers to determine requirements and feedback yielded mean scores (3.8) and the use of customer satisfaction data to review and improve the quality management system returned a mean score (3.9) which indicates that more respondents “agreed” with the statement than those who “disagreed”. The variation in responses is probably due to limited or lack of knowledge regarding the communication channels that exist with customers and the handling of complaints.

For question 3.6: the organisation’s use of suppliers that are ISO 9001:2000 certified generated a result that indicates that more respondents with a mean score (2.9) “disagreed” than those who “agreed” with the statement. This question contributes most to the gap score in this category since the gap difference is more than 2. It is evident from the negative response to this question that not all suppliers to the organisation are ISO 9001:2000 certified. Perhaps, this could impact negatively on final product quality as there is no guarantee on consistency of material inputs when dealing with non-certified suppliers.

For question 3.7: the result with regard to the inclusion of suppliers in quality improvement efforts of the organisation indicates that the respondents with a mean score (4.0) “agreed” with the statement. The limited number of certified suppliers to the organisation probably means that the organisation had the benefit of fostering close ties and mutual trust with these suppliers. This approach by the organisation is consistent with the belief of Deming (1986) cited by Reid (2001:66) that quality improvement could be achieved through single sourcing of suppliers

and long-term relationships based on trust.

For question 3.8: the respondents in this study were asked to indicate how the organisation manages suppliers that are not ISO 9001:2000 certified. The analysis of feedback in this regard show that the majority of the respondents indicated that the situation is managed through checks and analysis of incoming materials.

4.2.3.2 HYPOTHESIS TESTING

H2 - There is a significant relationship between ISO 9001:2000 certification and increased customer satisfaction.

A statistically significant result is obtained with p-values < 0.05 (highlighted in green in Tables 4.5 and 4.6). The Chi-square test results for the options within this category indicates that there is a difference in the expected frequencies for most options which implies that the alternate hypothesis (H2) claim, that the ISO 9001:2000 quality management standard enhances customer satisfaction is satisfied.

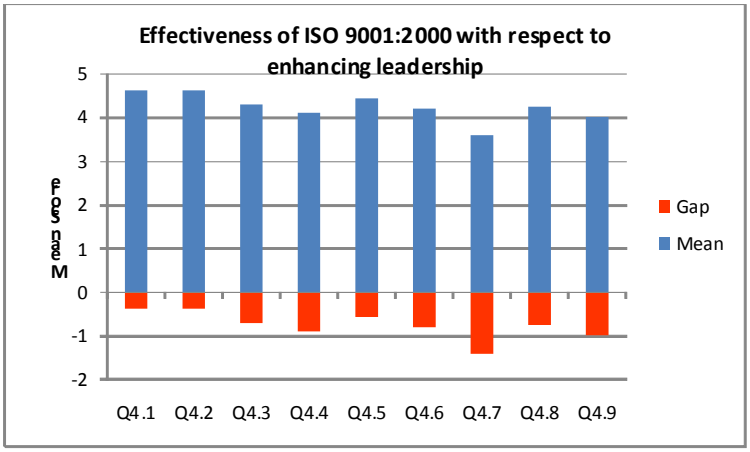
4.2.4 SECTION C: LEVEL OF EFFECTIVENESS OF ISO 9001:2000 WITH RESPECT TO ENHANCING LEADERSHIP

This category deals with employee's perceptions of the level of effectiveness of ISO 9001:2000 certification in respect of enhancing leadership.

4.2.4.1 ANALYSIS OF RESULTS AND DISCUSSION OF FINDINGS

The analysis of responses to the questionnaire with respect to the effectiveness of ISO 9001:2000 in enhancing leadership are shown in Figure 4.4 below and the discussion of findings follows.

Figure 4.4 Effectiveness of ISO 9001:2000 with Respect to Enhancing Leadership (n=31)



The individual scores for each of the questions within this category are shown in Table 4.7 on page 84:

Table 4.7 Mean Individual and Hypothesis Test Scores with Respect to Enhancing Leadership (n=31)

4. Top management:	Mean Score	p-value
4.1 is actively involved in establishing quality policy and quality objectives of the organisation	4.6	0.106
4.2 is effective in its communication of the quality policy and objectives throughout the organisation	4.6	0.000
4.3 leads the organisation by example	4.3	0.020
4.4 is committed to increasing employee awareness about the importance of customer satisfaction	4.1	0.000
4.5 creates an environment conducive to employee involvement and development	4.4	0.002
4.6 is knowledgeable on quality related matters, including customer needs and expectations	4.2	0.002
4.7 participates in improvement projects	3.6	0.194
4.8 is actively involved in reviewing organisational performance against its quality policy and objectives	4.2	0.000
4.9 is committed to ensuring the availability of appropriate resources to achieve the organisation's quality objectives	4.0	0.000

The overall average of the scores depicted in Table 4.7 regarding the effectiveness of ISO 9001:2000 with respect to enhanced leadership is 4.2 with a gap of 0.80.

There was general overall agreement with this category as indicated by the high mean score. This positive response means that the participants "agreed" that ISO 9001:2000 enhanced leadership. This result supports the assertion by Boulter and Bendell (2002:41) that the research findings of the Quality Research Group at the University of Leicester indicated a link to continuous improvement, top management involvement (leadership) and higher priority on resource considerations with the adoption of the ISO 9001:2000 standard.

Most of the gaps within this category are small except for the statement regarding

top management participation in improvement projects which generated a mean score (3.6). Although top management may be involved in behind the scenes planning and organising of improvement projects, their participation on the ground is significant in terms of creating urgency, motivating employees and most importantly, leading by example. Yusuf, Gunasekaran and Dan (2007:513) cite the work of Gilbert (1992) who is of the belief that leadership is the quality in a manager that induces others to follow. This is perhaps more likely to occur if managers are perceived to be actively involved thereby engaging the full commitment of their employees in continuous improvement projects.

Respondents were also asked to indicate the steps that have been taken to stimulate employee involvement and development in the organisation (question 4.10). Based on feedback from the respondents, it is evident that management has been proactive in this regard as demonstrated by the existence of workplace forums such as toolbox talks; employee involvement through the use of suggestion schemes and employee development with the aid of training programmes.

4.2.4.2 HYPOTHESIS TESTING

H3 - There is a significant relationship between ISO 9001:2000 certification and enhanced leadership.

A statistically significant result is obtained with p-values < 0.05 (highlighted in green in Table 4.7). The Chi-square test results for the options within this category indicates that there is a difference in the expected frequencies for most of the options which implies that the alternate hypothesis (H3) claim, that ISO 9001:2000 quality management standard enhances leadership is satisfied.

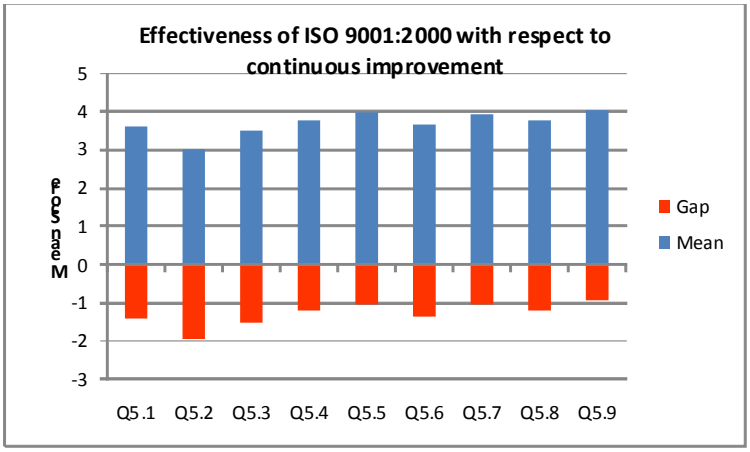
4.2.5 SECTION D: LEVEL OF EFFECTIVENESS OF ISO 9001:2000 WITH RESPECT TO CONTINUOUS IMPROVEMENT

This category deals with the employees' perceptions of the level of effectiveness of ISO 9001:2000 certification in respect of continuous improvement.

4.2.5.1 ANALYSIS OF RESULTS AND DISCUSSION OF FINDINGS

The analysis of responses to the questionnaire with respect to the effectiveness of ISO 9001:2000 in enhancing continuous improvement are shown in Figure 4.5 below and the discussion of findings follows.

Figure 4.5 Effectiveness of ISO 9001:2000 with Respect to Continuous Improvement (n=31)



The individual scores for each of the questions within this category are shown in Table 4.8 on page 87:

Table 4.8 Mean Individual and Hypothesis Test Scores with Respect to Continuous Improvement (n=31)

5. The process approach of ISO 9001:2000 has resulted in:	Mean Score	p-value
5.1 the identification of key business processes within the organisation	3.6	0.209
5.2 the mapping of key business processes in terms of their sequence and interactions	3.0	0.000
5.3 the objective measurement of key business processes in order to obtain results of process performance and effectiveness	3.5	1.000
5.4 a culture of process ownership	3.8	0.002
5.5 giving process owners full authority and responsibility	4.0	0.001
5.6 better cooperation among employees through a greater understanding of upstream and downstream requirements	3.7	0.004
5.7 a culture of continuous improvement through the tracking of key performance measures and feedback to those involved in the process	3.9	0.000
5.8 a high level of employee involvement	3.8	0.000
5.9 the collection and analysis of data that leads to informed decision-making and performance improvement	4.1	0.000

The overall average of the scores depicted in Table 4.8 regarding the effectiveness of ISO 9001:2000 with respect to continuous improvement is 3.7 with a gap of 1.3. The overall response in this category is close to agreement. Question 5.2 with a mean score of (3.0) has contributed most to the gap of 1.3.

For questions 5.1, 5.2, and 5.3: although the response is close to agreement, aspects such as the identification, mapping and measurement of key business processes fall appreciably short of expectation. The response in respect of the mapping of key business processes, in particular, demonstrates this point since the mean score (3.0) indicates that there were as many respondents that “agreed” as there were those who “disagreed” that the process approach of ISO 9001:2000 has resulted in this mapping of key business processes. The relatively high gap scores

are probably due to the respondents not fully comprehending the significance of the identification, mapping and measurement of key processes. This is perhaps indicative of the need for further training in this regard in order to consolidate the gains that have already been achieved in respect of continuous improvement. According to West (2001:65), the quality management system should reflect, with the aid of process mapping, the actual way in which the organisation operates so as to assist employees in aligning an organisation's written processes with actual practice. This is reinforced by Westcott (2007) in Sanders (2007:32) who asserts that the identification, mapping and objective measurement of key business processes are a few of the basic principles that should be followed in order to manage processes on the route to continuous improvement.

For question 5.6: the result with respect to the process approach leading to better cooperation among employees through greater understanding of upstream and downstream requirements elicited a response that resulted in a mean score (3.7). According to Sever (2007:48), the process approach assists departments and managers to co-own problems. This facilitates interdepartmental communication required for improvement and ensures that employees better understand upstream and downstream requirements as a priority in their daily work. It can be inferred that creating greater awareness among employees about internal customer requirements will perhaps ensure that external customer requirements are more likely to be met.

The respondents were also required to indicate the level of employee involvement in the organisation (question 5.10). The most significant approach to problem solving or performance improvement activities, according to the respondents involved corrective action requests. Incident investigations, suggestion schemes and, to a lesser degree, Safety, Health, Environmental and Quality meetings were also viewed as means of involving employees in the process of problem solving and performance improvement.

4.2.5.2 HYPOTHESIS TESTING

H4 - There is a significant relationship between ISO 9001:2000 certification and continuous improvement.

A statistically significant result is obtained with p-values < 0.05 (highlighted in green in Table 4.8). The Chi-square test results for the options within this category indicates that there is a difference in the expected frequencies for most of the options which implies that the alternate hypothesis (H4) claim, that the ISO 9001:2000 quality management standard enhances continuous improvement is satisfied.

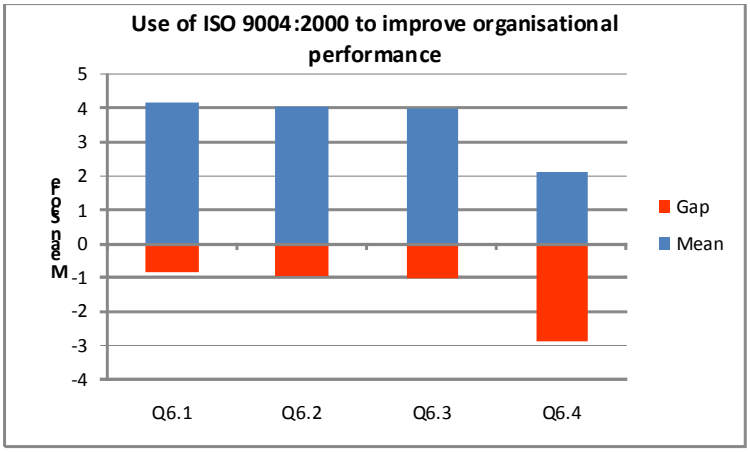
4.2.6 SECTION E: USE OF ISO 9004:2000 TO IMPROVE ORGANISATIONAL PERFORMANCE

This category deals with the employees' perceptions of the usefulness and extent of use of the ISO 9004:2000 standard to improve performance in the organisation.

4.2.6.1 ANALYSIS OF RESULTS AND DISCUSSION OF FINDINGS

The analysis of responses to the questionnaire with respect to the usefulness of ISO 9004 in improving organisational performance are shown in Figure 4.6 below and the discussion of findings follows.

Figure 4.6 Use of ISO 9004:2000 to Improve Organisational Performance (n=31)



The individual scores for each of the questions within this category are shown in Table 4.9 on page 91:

Table 4.9 Mean Individual and Hypothesis Test Scores with Respect to Use of ISO 9004:2000 to Improve Organisational Performance (n=31)

6. The ISO 9004:2000 quality management standard:	Mean Score	p-value
6.1 was developed as one of a consistent pair of standards along with ISO 9001:2000 and is being used as such in the organisation	4.2	0.000
6.2 is an adequate guide to improve performance beyond conformance required by ISO 9001:2000	4.0	0.000
6.3 has led to increased productivity, reduced cost of operation and improved customer satisfaction	4.0	0.001
6.4 is not used because other business improvement approaches are being used to bring about the desired levels of performance improvement	2.1	0.000

The overall average of the scores depicted in Table 4.9 regarding the use of ISO 9004 to improve organisational performance is 3.6 with a gap of 1.4. The largest contributor to the gap was question 6.4 that pertained to the use of other business improvement approaches rather than ISO 9004 to improve performance.

For question 6.1: the respondents “agreed” with mean score (4.2) that ISO 9004 was being used in combination with ISO 9001 in the organisation, which, according to Boys, Karapetrovic and Wilcock (2004:844), ought to enhance their quality management systems on the road to business excellence.

For questions 6.2 and 6.3: the results indicate that the respondents with a mean scores (4.0) “agreed” with the statements regarding the adequacy of ISO 9004:2000 to improve organisational performance and that it probably leads to improved productivity, reduced costs and enhanced customer satisfaction.

For question 6.4: the mean score (2.1) indicates that the respondents “disagreed” with the statement that other business improvement approaches were being used rather than ISO 9004 to bring about performance improvement. This finding

suggests that ISO 9004 is probably being used along with ISO 9001 to bring about performance improvement in the organisation. This supports the assertion of Boys, Karapetrovic, and Wilcock (2004:844) that the ISO 9004:2000 standard provides guidance for the continuous improvement of the existing quality systems beyond the minimal requirements of ISO 9001. It should be noted, however, that ISO 9004:2000 goes beyond customer satisfaction and includes the satisfaction of employees, investors, suppliers, partners and society at large (Boys, Karapetrovic, and Wilcock, 2004:844-845).

4.2.6.2 HYPOTHESIS TESTING

H5 - There is a significant relationship between ISO 9001:2000 certification and the use of ISO 9004 to improve performance.

A statistically significant result is obtained with p-values < 0.05 (highlighted in green in Table 4.9). The Chi-square test results for the options within this category indicates that there is a difference in the expected frequencies for all of the options which implies that the alternate hypothesis (H5) claim, that ISO 9004 is used along with ISO 9001 to improve performance is satisfied.

4.2.7 SECTION F: EXTENT OF USE OF BUSINESS IMPROVEMENT APPROACHES

Respondents were asked to select, from a list of options reflected in Table 4.10 below, the business improvement approaches or techniques which are used in the organisation. The responses are shown below:

Table 4.10 Business Improvement Approaches or Techniques in Use (n=31)

	Frequency	%
Total Quality Management	31	100%
Six Sigma	0	0%
Business Process Re-engineering	0	0%
Quality Function Deployment	0	0%
Lean Manufacturing	0	0%
Business Excellence Models	0	0%
Other	0	0%
None	0	0%
	31	**100%**

As illustrated in Table 4.10, all of the respondents (100%) identified Total Quality Management as the only business improvement approach used. Based on a study carried out in Greek industry, Gotzamani and Tsiotras (2001:1339) are of the opinion that development and certification of a quality assurance system according to one of the ISO 9000 standards is potentially, a good first step to Total Quality Management. This is reinforced by (Gotzamani, 2005:647) who believes that the ISO 9001:2000 standard is based on quality management principles that overlap with the principles of Total Quality Management as well as acclaimed business excellence models. It is thus evident from the literature that the ISO 9001:2000 quality management standard probably has the structure and focus to bring about performance improvement in the organisation.

There were nil responses for questions 7.9 to 7.12 due to these not being applicable. The respondents were also required to provide feedback on the level to which they perceived management to be committed to making ISO 9000:2000 a success in the organisation (question 7.13). The majority of respondents (86%) indicated that continuous improvement was the principal means of ensuring the success of the ISO 9000 quality management system. Stevenson (2002:475) describes continuous improvement as a conceptual basis for problem solving which probably makes it an ideal approach to effect performance improvement. This is reinforced by Yusuf, Gunasekaran and Dan (2007:514) who believe that the continuous improvement process focuses on setting out process management responsibilities; forecasting changes in customer needs; generating customer satisfaction; employee involvement; measuring and assessing performance; planning; control and problem solving. The successful execution of the aforementioned activities will probably lead to improved performance and customer satisfaction.

4.2.8 SECTION G: CUSTOMER COMPLAINTS DATA PRE- AND POST ISO 9001:2000 CERTIFICATION

This category deals with the comparison of the customer complaints data from before and after ISO 9001:2000 certification. The customer complaints data was presented in the ratio of number of complaints received per thousand tons produced.

4.2.8.1 ANALYSIS OF RESULTS AND DISCUSSION OF FINDINGS

The results for the pre- and post customer complaints data were analysed and discussed in chapter three.

4.2.8.2 HYPOTHESIS TESTING

H6 - There is a significant difference in the level of customer complaints pre- and post ISO 9001:2000 certification.

A comparative t-test was done for the level of customer complaints pre- and post ISO 9001:2000 certification. The results are presented in Table 4.11 below:

Table 4.11 T-test for Independent Samples

	p - values	
Comparison	Equal variances assumed	Equal variances not assumed
Before - year 1	0.122	0.009
Before - year 2 (cumulative)	0.094	0.029
Before - year 3 (cumulative)	0.035	0.014
Before - year 4 (cumulative)	0.017	0.012

The analysis indicates that there has been a difference in the level of customer complaints since ISO 9001:2000 certification. Data for the first two years post ISO

9001 certification indicated that the means were similar, but starting to decrease from 0.122 to 0.094. From year three onwards, the test indicates that there has been a complete shift as the p-values are less than 0.05 indicating that the alternate hypothesis (H6) claim that there is a difference in the mean values before and after ISO 9001:2000 certification is satisfied.

4.3 SUMMARY

The findings of this study have shown that the ISO 9001:2000 quality management standard, which has led to a reduction in the level of customer complaints, is effective in enhancing customer satisfaction, leadership, and continuous improvement in the selected organisation. The conclusion and recommendations arising out of this study are presented in chapter 5.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 CONCLUSION

Organisations are constantly under pressure to perform in order to satisfy all its stakeholders. When the economy is strong, competitive markets create a challenging business environment for organisations. The situation becomes even more demanding in the event of an economic downturn. With the current international economy in a state of decline, the management of most organisations are embarking on cost cutting measures in order to stay in business. This means that the situation makes it increasingly difficult for management to justify expenditure on a quality management system such as ISO 9001 which requires a substantial outlay of funds to implement. However, it could prove to be even more costly to organisations that choose to disregard the value of implementing a quality management standard such as ISO 9001.

It can be concluded that marketing is one of many motives for the organisation to implement ISO 9001. Being accredited with an international standard can have positive outcomes since many organisations require suppliers to be ISO 9001 certified in order to be part of their supply chain (Meredith and Shafer, 2002:80). The study also revealed that apart from marketing, the other perceived benefits of ISO 9001 implementation included improved quality, productivity, cost reduction and customer satisfaction.

A favourable conclusion can be drawn with regard to the effectiveness of ISO 9001 in ensuring customer satisfaction. The standard requires that customer requirements be determined and met (Reid, 2001:66). It also requires that the organisation maintains communication with the customer. This stands the organisation in good stead to determine and generate exactly what the customer requires. Moreover, regular contact with the customer can help with early detection of potential problem areas which can be rectified immediately. This reduces the

probability of losing a dissatisfied customer to a competitor which is of enormous significance given the current market conditions.

The study revealed that management has set up workplace forums such as toolbox talks; created opportunities for employee involvement in the form of suggestion schemes; and promoted employee development through training programmes. It can be concluded that management demonstrates an element of leadership by fostering employee involvement and development.

The research showed that the ISO 9001 standard is effective in ensuring continuous improvement. The process approach of ISO 9001 complements continuous improvement through the involvement of trained and knowledgeable employees in improvement activities. A few of the performance improvement activities in the organisation include corrective action requests, a suggestion scheme, and incident investigation but these may not be adequate to maximise the benefit of the ISO 9001 standard to the organisation.

Various business improvement approaches were reviewed which included Business Excellence Models; Total Quality Management; Six Sigma; Business Process Re-engineering; Quality Function Deployment; and Lean Manufacturing. All of these approaches were deemed capable, at various levels, of complementing the ISO 9001 quality management standard in improving organisational performance and customer satisfaction.

The study was also carried out to determine the level of customer complaints pre- and post ISO 9001:2000 certification. It showed that the customer complaints ratio underwent a marginal downward trend in the first two years after certification. A statistically significant result in this regard was obtained for years three and four indicating that the mean values were indeed different pre- and post ISO 9001:2000 certification. Thus, it can be concluded that ISO 9001:2000 certification has resulted in a decrease in the customer complaints ratio for the organisation being studied as shown in the empirical analysis.

5.2 RECOMMENDATIONS

The study revealed that wrapping and packaging material quality; pallet quality; and damage to product during shipment continue to be a problem. The latter could be due to negligent handling and is more difficult to resolve because there is a lack of control over the product once it leaves the organisation's premises. However, the problems facing the organisation in respect of the quality of wrapping and packaging materials as well as pallet quality are cause for concern. Although it is useful, as the study indicated, to check and analyse incoming materials, this option does not provide a long-term solution. Therefore, it is recommended that the aforementioned problems are more likely to be resolved through better managed supplier relations. This can be achieved by creating mutually beneficial relations with suppliers which involves regular meetings and assistance with technical expertise to improve their processes. Furthermore, it is in the interest of the organisation that the suppliers undergo growth and development as this could possibly lead to an improvement in the quality of their output. This is likely to generate more consistent inputs into the organisation's processes leading to higher quality output thereby improving the level of customer satisfaction.

It is also in the interest of the organisation to remain ISO 9001 certified from a marketing perspective since many organisations tend to only engage suppliers that are certified. This is of great importance to the long term sustainability of the organisation particularly during periods of economic decline.

It is recommended that the employees of the organisation be kept informed about the communication channels that exist with customers, particularly with regard to the receipt, handling and nature of complaints. This represents one method of employee involvement which can be taken further by arranging field visits, where practical, for them to view the impact of their output on the customer's processes.

The research indicated that the ISO 9001 standard is effective in ensuring top management involvement with respect to communicating the importance of meeting customer requirements throughout the organisation; determining quality

policy; conducting management reviews and the provision of the necessary resources. However, the employees' perception of top management participation in improvement projects is below expectation. Thus, management should perhaps become involved in improvement projects on the ground as a means of leading by example. This will have the positive effect of displaying their commitment to the quality goals of the organisation. Furthermore, it will also serve to motivate employees to higher levels of commitment and performance.

The process approach of the ISO 9001 quality management standard is probably the key to driving performance improvement in the organisation. West (2001:65) indicates that one of the requirements of the ISO 9001 standard is the identification of the processes of the quality management system as well as their sequence and interactions. Sever (2007:32) suggests that the latter can be accomplished through process mapping which can also help employees better understand upstream and downstream requirements. In this regard it is recommended that employees should take greater ownership of the processes in which they are involved in order to be effective.

Although there was a favourable result in terms of ISO 9001 being effective in bringing about continuous improvement, it is evident that there is room for improvement. Perhaps, this can be accomplished through additional training programmes that place a greater emphasis on the mapping of key business processes as well as the measurement and tracking thereof. It is this knowledge that can help empower employees to become more involved in organisational processes thereby leading to an improvement in the level of performance. Although there are performance improvement activities in existence, management should also institute continuous improvement teams to reinforce and build on current gains.

The result of the study with respect to the use of the ISO 9004 quality management standard to improve performance in the organisation yielded a positive response which is consistent with the claim of Boys, Karapetrovic and Wilcock (2004:844) that this standard can be used to improve performance beyond conformance

required by ISO 9001. Although the benefits to the organisation include improved performance and customer satisfaction, the organisation may not necessarily be achieving the most out of ISO 9004. In order for ISO 9004 to be used for the purpose it was designed, it is recommended that the organisation adopt a strategic approach of satisfying multiple stakeholders. This would require an assessment of the level of satisfaction of stakeholders such as employees, customers, investors, suppliers, and the community. The latter is particularly significant given that there is an increasing tendency to appraise organisations based on their commitment to social responsibilities. This is supported by Mullins (2002:143) who contends that consumer activism has never been more intense and that the media are always quick to expose unethical practices by organisations. Top management should therefore afford this imperative more rigorous attention.

The results of the research also indicated that, in addition to ISO 9001, management of this organisation has adopted the TQM approach. Perhaps, the eight quality management principles at the core of the ISO 9001 standard along with the process approach makes it ideally suited to being used in synergy with the Business Excellence Model and TQM as a further means of improving customer satisfaction and performance. This is supported by Bendell (2000:14) who is of the opinion that ISO 9001 complements Business Excellence Models in the pursuit of organisational excellence, as well as Mahadevappa and Kotreswar (2004:304) who are of the belief that the ISO 9001 quality management standard is useful as a first step to or on the path to TQM.

Of the other business improvement approaches reviewed, Six Sigma could probably be the most useful to the organisation with its defect target of 3.47 per million opportunities and its improvement methodology based on factual data. Thus, this approach is well suited to complement the ISO 9001 quality management standard in improving organisational performance and customer satisfaction.

The literature review and findings of the research in the selected organisation paint a positive picture of ISO 9001 quality management standard. However, it is

apparent that the organisation will reap maximum benefit from the standard if it is used in combination with business improvement approaches such as the Business Excellence Model and/or Six Sigma.

5.3 FUTURE RESEARCH

If the selected organisation acts on the conclusion emanating from this study and the recommendations made, then one of the avenues for further research is to study the impact of these changes on performance and customer satisfaction. Also, since the findings of this research were limited to the selected organisation, the opportunity exists for further research in this regard on a wider scale for similar organisations that are ISO 9001 compliant.

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LETTER OF INFORMED CONSENT ANNEXURE A

07 OCTOBER 2008

TO WHOM IT MAY CONCERN

Mr. R. Moodaliyar approached me, Mr. K. Moodley the Quality and Environmental Manager, with a request to conduct a research investigation into the impact of ISO 9001: 2000 Quality Management Standard on organisational performance in 2001. Following a discussion with the Works Manager at the time, Mr. J. Lotter, it was decided to permit Mr. Moodaliyar to conduct the study at the company on the grounds that the company name, suppliers and customer details are not disclosed.

The company obtained ISO 9001: 2000 certification in December 2004 Mr. Moodaliyar has collected data which includes monthly production figures and customer complaints from 2001 to 2007.

Kind regards

.....

KAS MOODLEY
QE MANAGER

LETTER OF CONSENT TO PARTICIPATE **ANNEXURE B**

DURBAN UNIVERSITY of TECHNOLOGY

26 May 2009

Sir/Madam

RESEARCH QUESTIONNAIRE

I am a M. Tech: Quality student at the Durban University of Technology and I am currently engaged in a study investigating the Impact of the ISO 9000 Quality Management Standards on Organisational Performance.

It will be greatly appreciated if you would kindly complete the following questionnaire. The questionnaire would take approximately twenty minutes to complete. You are entitled to request a summary of the results of the study, if so desired.

Confidentiality of the information will be respected.

Thank you for your co-operation.

Yours sincerely

R. Moodaliyar

Tel: 031 373 5357
Fax: 0866740830
email: moodalr@dut.ac.za

I consent to participate in this study.

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SIGNATURE OF PARTICIPANT DATE

RESEARCH QUESTIONNAIRE ANNEXURE C

Work Area:

Process / Operation / Activity:

Designation:

Indicate your response to the following statements by ticking the box that is most appropriate.

Section A: Motive/s for obtaining ISO 9001:2000 certification

1. ISO 9001:2000 certification was obtained:

	strongly agree	agree	neither agree nor disagree	disagree	strongly disagree
1.1 strictly as a customer requirement	5	4	3	2	1
1.2 to improve market opportunities	5	4	3	2	1
1.3 as an initiative to improve quality in the organisation	5	4	3	2	1
1.4 to increase productivity in the organisation	5	4	3	2	1
1.5 to reduce costs in the organisation	5	4	3	2	1
1.6 to improve customer satisfaction	5	4	3	2	1
1.7 in order to qualify for government, and other tenders	5	4	3	2	1

Section B: Level of effectiveness of ISO 9001:2000 with respect to ensuring customer satisfaction

2. Complaints from the customer

	strongly agree	agree	neither agree nor disagree	disagree	strongly disagree
2.1 is the only form of external feedback to the organisation regarding product quality	5	4	3	2	1
2.2 include non-conformities reported by internal customers	5	4	3	2	1
2.3 are actively encouraged by the organisation	5	4	3	2	1
2.4 have decreased in the period following ISO 9001:2000 certification	5	4	3	2	1

2.5 Indicate the organisation's sources of information on customer satisfaction:

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3. The organisation strives to:

	strongly agree	agree	neither agree nor disagree	disagree	strongly disagree
3.1 determine customer needs and expectations	5	4	3	2	1
3.2 communicate the importance of meeting customer needs and expectations throughout the organisation	5	4	3	2	1
3.3 communicate with customers to determine requirements	5	4	3	2	1
3.4 communicate with customers to receive feedback	5	4	3	2	1
3.5 use customer satisfaction data in the process of reviewing and improving the quality management system	5	4	3	2	1
3.6 make use of suppliers that are ISO 9001:2000 certified in an effort to improve quality of inputs into its processes	5	4	3	2	1
3.7 include its suppliers in quality improvement efforts	5	4	3	2	1

3.8 Indicate how the organisation manages suppliers that are not ISO 9001:2000 certified:

Section C: Level of effectiveness of ISO 9001:2000 certification with respect to enhancing leadership

4. Top management:

	strongly agree	agree	neither agree nor disagree	disagree	strongly disagree
4.1 is actively involved in establishing quality quality policy and quality objectives of the organisation	5	4	3	2	1
4.2 is effective in its communication of the quality policy and objectives throughout the organisation	5	4	3	2	1
4.3 leads the organisation by example	5	4	3	2	1
4.4 is committed to increasing employee awareness about the importance of customer satisfaction	5	4	3	2	1
4.5 creates an environment conducive to employee involvement and development	5	4	3	2	1
4.6 is knowledgeable on quality related matters, including customer needs and expectations	5	4	3	2	1
4.7 participates in improvement projects	5	4	3	2	1
4.8 is actively involved in reviewing organisational performance against its quality policy and objectives	5	4	3	2	1
4.9 is committed to ensuring the availability of appropriate resources to achieve the organisation's quality objectives	5	4	3	2	1

4.10 Indicate what steps have been taken to stimulate employee involvement and development:

Section D: Level of effectiveness of ISO 9001:2000 certification with respect to continuous improvement

5. The process approach of ISO 9001:2000 has resulted in:

	strongly agree	agree	neither agree nor disagree	disagree	strongly disagree
5.1 the identification of key business processes within the organisation	5	4	3	2	1
5.2 the mapping of key business processes in terms of their sequence and interactions	5	4	3	2	1
5.3 the objective measurement of key business processes in order to obtain results of process performance and effectiveness	5	4	3	2	1
5.4 a culture of process ownership	5	4	3	2	1
5.5 giving process owners full authority and responsibility	5	4	3	2	1
5.6 better cooperation among employees through a greater understanding of upstream and downstream requirements	5	4	3	2	1
5.7 a culture of continuous improvement through the tracking of key performance measures and feedback to those involved in the process	5	4	3	2	1
5.8 a high level of employee involvement in continuous improvement activities	5	4	3	2	1
5.9 the collection and analysis of data that leads to informed decision-making and and performance improvement	5	4	3	2	1

5.10 Indicate the approach adopted to problem solving or performance improvement activities with respect to employee involvement:

Section E: Use of ISO 9004:2000 to improve organisational performance

6. The ISO 9004:2000 Quality Management Standard:

	strongly agree	agree	neither agree nor disagree	disagree	strongly disagree
6.1 was developed as one of a consistent pair of standards along with ISO 9001:2000 and is being used as such in the organisation	5	4	3	2	1
6.2 is an adequate guide to improve performance beyond conformance required by ISO 9001:2000.	5	4	3	2	1
6.3 has led to increased productivity, reduced cost of operation and improved customer customer satisfaction	5	4	3	2	1
6.4 is not used because other business improvement approaches are being used to bring about the desired levels of performance improvement	5	4	3	2	1

Section F: Extent of use of business improvement approaches

7. Indicate which business improvement approaches or techniques are in use by ticking the appropriate boxes.

7.1 ☐ Total Quality Management

7.2 ☐ Six Sigma

7.3 ☐ Business Process Re-engineering

7.4 ☐ Quality Function Deployment

7.5 ☐ Lean Manufacturing

7.6 ☐ Business Excellence Models

7.7 ☐ Approaches or Techniques other than those shown above

7.8 ☐ None

7.9 If 7.7 has been selected, specify which techniques or approaches are in use:

7.10 If 7.6 has been selected, specify which model or adaptation thereof is in use:

7.11 Indicate whether the business improvement approaches or techniques selected are in use because ISO 9000:2000 is inadequate at improving performance or that ISO 9000:2000 is complementary to these approaches or techniques:

7.12 Briefly explain the basis for your response to question 7.11:

7.13 Indicate the extent to which management has committed to making ISO 9000:2000 work for the organisation:

Thank you