THE ASSOCIATION OF TOTAL QUALITY MANAGEMENT AND FINANCIAL PERFORMANCE IN SELECTED SOUTH AFRICAN INFORMATION TECHNOLOGY ORGANISATIONS

Jaromir Vomacka

A research report submitted to the Faculty of Engineering and the Built Environment, University of Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree of Master of Science in Engineering.

Johannesburg, 2008

Declaration

I declare that this research project is my own, unaided work. It is being submitted for the degree of Master of Science of Engineering in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in any other university.

_____

Jaromir Vomacka

February 2008

Abstract

This study evaluates Total Quality Management (TQM) implementation and its association with financial performance in ten South African Information Technology (IT) organisations listed on the JSE. It uses a cross-sectional survey that uses questionnaires and interviews to obtain data on TQM at the selected organisations. A descriptive analysis of the data indicates that the organisations with higher TQM scores prove to do better in the financial area, but the null hypothesis of no association between TQM and financial performance cannot be rejected.

An exploration of current and future trends with regards to TQM, quality management philosophies in general, and the IT industry in particular is also undertaken. The traditional ideology behind TQM remains in place, but needs an adjustment. A model is formed for an integrated management system that includes concerns for internal and external influences in the IT sector.

Acknowledgements

I wish to express my gratitude to the following people for assisting me in my research:

Professor Snaddon, first, for guiding me to take on a Masters Degree in Industrial Engineering. Second, for his patience and guidance in his role as my supervisor. He continually steered me in the right direction when I got off track and dismayed.

The representatives at the various IT organisations selected who permitted and facilitated my research. In addition to supplying me with any information I required, they all spared some time to provide views and approaches to total quality management at IT organisations in South Africa.

My parents whom without any of this would not be possible. They have always believed in me and made me believe in myself. They have sacrificed much for me and in allowing me to complete my studies. For their never-ending love, drive, support, help, and enthusiasm, I dedicate this work to them with all my love and gratitude.

Table of Contents

List of Figures

List of Tables

PART ONE: INTRODUCTION

Chapter One: Introduction

1.1. Introduction

This study assesses the implementation of Total Quality Management (TQM) in the organisations selected from the Information Technology (IT) sector of the Johannesburg Stock Exchange (JSE), an exploration of these organisations' financial performance corresponding to TQM, and a determination of current and future trends both worldwide and in South Africa with regards to TQM and quality management philosophies in general and the IT industry in particular.

1.2. The Research Objectives

The main aim of the research is to evaluate the association between TQM and financial performance in selected IT sector organisations listed on the JSE. The impetus for the study was the lack of known work in this area in South Africa.

The following objectives set out for the study and the manner they are carried out are as follows:

1. To determine the extent of application of TQM principles in the organisations. These are revealed by analysing the results from the TQM questionnaires.
2. To examine financial performance of the organisations. This is tested by calculating six financial indicators using financial statements.
3. To establish if there is any direct link between TQM and financial performance overall and in each organisation individually. This is achieved by applying a multiple linear regression to the TQM and financial performance scores. The null hypothesis is that there is no association between the number of TQM principles implemented and financial performance of organisations of the Information Technology sector listed on the JSE.
4. To discuss evolution of TQM on the whole and, above all, in the IT industry. The material to demonstrate changes coming about in TQM derives from interviews

with the organisations' representatives and is further complemented, as learnt from literature review, by viewpoints of renowned experts.

1.3. Layout of the Research Project

The report is separated into Four Parts – introduction (chapter 1), literature review (chapters 2 to 5), research process (chapter 6), and analysis, discussion, and conclusion of research findings (chapters 7 to 9). From the literature review undertaken, objectives and the hypothesis can be formulated. The methods used (questionnaires and interviews) provide empirical results. The methods and results are discussed and conclusions formed.

Chapter Two is the first chapter in the literature review. It examines the origins of TQM by providing an overview of the relevant theories. The founders of the TQM movement provide the original theory, forming a base for further expansion.

Chapter Three extends the defined core principles and common elements of TQM to understand the TQM fundamentals and their evolution. Additionally, the modern approach to quality is defined by detailing modern quality management entities such as ISO9000:2000 and the Malcolm Baldrige Quality Award.

Chapter Four addresses various aspects of corporate finance and the ways of defining and assessing financial performance. The chosen financial indicators are listed and discussed and the reasons behind their choice explained.

Chapter Five describes how TQM may, theoretically, influence business performance. Examples of past and current studies performed are used to provide various linkages between quality, profitability, productivity, market share, and competitiveness.

Chapter Six outlines the research process used in this research containing details of the survey methods used (questionnaires and interviews) along with the statistical analysis implemented to validate the results. The method of analysis in obtaining the results for both the TQM results and financial performance are also stated.

The concluding three chapters, Seven to Nine, constitute Part Four. Chapter Seven presents the findings. Chapter Eight details the results found in the research study by means of discussing each objective set. The TQM and financial performance results altogether with any link between them, as well as current trends in the IT industry with respect to quality management are discussed. Chapter Nine covers the conclusions, implications of the study, and recommendations for further research.

1.4. Assumption

Considering that this is a cross-sectional study where selected users provide significant amounts of information, the major assumption is that the respondents are truthful and knowledgeable.

1.5. Limitations of the Study

Limitations incurred in this study are:

- Sample bias – inferences cannot be drawn about the proportion of the population (all IT organisations listed on the JSE) showing a principle of TQM, this is because organisations in the study form a nonprobability sample.
- Nonparticipation bias – response rate affects the final sample (the lower the response rate, the greater the sample bias), in unknown ways.
- The questionnaire is based on the guidelines for evaluation of applicants for the Malcolm Baldrige National Quality Award and questions used previously in the case studies of Ross (1994) to evaluate organisations. The researcher attempts to ascertain its internal consistency reliability by Cronbach's alpha testing, and the statistical significance of the observed association between questionnaire parts by the chi-square statistic. The questionnaire has, however, been created for the purpose of the study and not been previously independently validated.
- Interviews were informal, not uniformly pre-structured, and not requiring unambiguous answers.

- The type of method – cross-sectional survey provides a snap shot of the organisations' TQM implementation.
- Time – the assessment period was brief and time may affect the responses.

The study is limited to the South African Information Technology (IT) sector. The current economic environment in South Africa could be an important factor to consider in the study bearing in mind that economical conditions may affect growth and financial conditions of organisations. The study focuses on the year in which the study is done – 2005/2006. Appendix A provides an economic analysis, with certain elements highlighted throughout the main text. Appendix A then describes why the information technology (IT) sector is chosen. Political and legal influences on IT organisations are discussed subsequently. The types of organisations that are investigated in this research are public limited organisations listed on the information technology (IT) sector of the Johannesburg Securities Exchange (JSE). Any reference to firms, companies, organisations, businesses, etc. implies organisations of this nature i.e. listed organisations dealing with IT issues. Extra information on these and other types of organisations can be found in Appendix B.

The economic and industry analysis in Appendix A shows external factors that may be presently shaping the IT industry. A positive outlook for the industry seems to be in place (low interest rates spurring improved GDP growth encouraging progression in cyclical sectors such as IT and a relatively stable exchange rate). Government influences have also been discussed because they can affect financial performance of organisations and remove emphasis from a quality management philosophy such as TQM. These are topics such as corporate governance and ethics, sustainability issues, and black economic empowerment (BEE) criteria.

For example, even if an organisation is not implementing TQM but has strong BEE connections, deals with government initiatives, supplies communications infrastructure, and manages the upgrade of network systems and computers for society, its financial performance might be better to that one of an organisation with a superior TQM system in place, but which is "poorly connected". Appendix A provides an example of this. Mustek sold a 25% share in itself and continued with the

BEE initiative in terms of training (skills development) blue-collar workforce and promoting advancement in the workplace. The BEE drives undertaken by Mustek helps secure business deals with other private organisations and the government (Kruger, 2005). This is one case where external influences on an organisation may affect its financial performance. The same could apply to corporate governance and proudly SA (see Appendix A).

It is assumed that listed organisations are interested in long-term prosperity, aware and in favour of current trends in the industry and hence implementing what is required. External factors are excluded when analysing the results. These external factors are beyond the researcher's control and are only introduced to complete a current economic and industrial analysis, even though they may affect financial performance.

With regards to the type of method used for measuring financial performance, only published financial data from income statements and balance sheets are used in this study. No attempt is made to use any kind of future values such as forward price/earnings (P/E) ratios, forecasted headline earnings per share (HEPS), weighted average cost of capital (WACC) with estimated cash flows etc. It is for this reason; techniques such as the Free Cash Flow Model and Dividend Discount Model are not used.

1.6. Importance of Conclusions

Data on the extent of TQM implementation in selected organisations are found and assessed. The questionnaire allows an assessment of TQM in organisations.

The main focus analyses the association between TQM and financial performance. A link may show the importance of TQM in South African IT organisations. If no association is found, other justifications for implementing TQM must be made.

The research also highlights current or future trends of TQM and other quality management entities in the IT industry in South Africa.

PART TWO: LITERATURE REVIEW

Chapter Two: Theories of Total Quality Management

2.1. Introduction

This section examines the origins of TQM discussing the theories developed and put forward by the pioneers of the quality movement. The main focus is the common threads between the theories. Pioneers in the field include W. Edwards Deming, Joseph M. Juran, Armand V. Feigenbaum, and Philip Crosby. An explanation of each ones' separate view on quality can be found in Appendix C. These authors' contributions are explained to form the base for the core principles of TQM.

The theories and advice given by the pioneers of TQM should still be taken into consideration in the 21st century. TQM as a management philosophy will, overall, be the same with minor additions and deletions over time.

2.2. Common Elements of Quality

The field of quality management has been strongly influenced by its pioneers whose works have been presented in Appendix C. It would be a mistake to concentrate solely on the views of one pioneer, because all, Deming, Juran, Feigenbaum and Crosby, have, by their original thinking, documented the basis of quality and contributed towards its development.

Deming calls quality management "continuous improvement" whilst Juran speaks of "fitness for use", and Crosby uses the phrase "conformance to requirements". Although using different words, all subscribe to the similar idea incorporated under the TQM umbrella. Deming rationalises his theory of quality management in terms of 14 principles, which include design of product, specification of the service offered and improving the quality of the working environment. Crosby, too, proposes 14 steps to the quality management process and promotes the concepts of `zero defects' in his `absolutes of quality'. Juran also prescribes steps for quality management. All these

steps and principles have common binding elements that form some of the basic principles of total quality. Generally, they belong to two different categories: those focusing on technical processes and tools, and those focusing on managerial dimensions (Ross, 1991, p.7). Deming provides manufacturers with methods to measure the variations in a production process to determine the causes of poor quality. Juran emphasises setting specific annual goals and establishing teams to work on them. Crosby stresses a programme of zero defects whilst Feigenbaum teaches total quality control aimed at managing by applying statistical and engineering methods throughout the organisation. Despite these differences, certain common elements of quality remain (Cortada, 1995, p.10; Ross, 1994, p.8):

- Management and the system, rather than the workers, are the cause of poor quality. Managers often get in the way of an organisation's transformation and are at fault if the workers do not produce quality in all that they do.
- Prevention is the key as opposed to inspection.
- Top management involvement is a key ingredient and drives the quality initiative.
- A quality culture needs to be integrated into the organisation.
- Human resource development such as training and education are vital in total quality management. The manager must involve employees making sure that they are empowered to make decisions regarding quality.
- Quality requires strategic planning with a set policy and plan to confirm the proper implementation of quality. Quality must be approached specifically and systematically.
- Quality is a continuous process and the programme for quality is therefore always ongoing. Quality takes time to implement and quick fixes do not work.
- Customer expectations should be studied and followed for customer satisfaction. Customers are the central focus of improvement processes.
- Organisations need to be restructured so that processes can communicate more effectively and work together as opposed to different entities.
- The cost of quality should be calculated to determine weak points in the activities of organisations.
- Quality is first; schedules and cost considerations only follow.

2.3. Into the 21st Century

Organisations and technology change with changing challenges. Some challenges that have changed are (Gruska, 2000, pp. S779-S788):

- altered labour markets - workforce with higher skill levels;
- increasing customer expectations - customers have come to expect continual improvement of product and service quality;
- the advancement of technology;
- globalisation - the world is becoming a global village and global events become the concern of all the world's population; and
- government intervention – government getting involved in business aspects of private organisations.

Due to the new challenges, persistent learning and the importance of continuous TQM may be encouraged. The improvement processes have been discussed by the TQM pioneers and even though slightly adapted for the 21st century, they may still provide an adequate base.

With some common elements for quality established, based on pioneers' works, a definition of TQM can be sought. A TQM scale can then be formulated from associated quality management entities and TQM principles.

Chapter Three: The Principles of Total Quality Management

3.1. Introduction

The pioneers' theories and their common elements of quality supply the foundation for the principles, or characteristics, of TQM. TQM is not a single process that can be applied universally to any single organisation, but must be understood, customised and applied over time throughout the organisation for continuous improvement. The pioneers of TQM developed certain principles and highlighted key approaches and implementations but it is up to the organisation to further develop those ideas into practical methods that work for that particular organisation.

This chapter discusses TQM frameworks, models, and standards such as ISO 9000, Malcolm Baldrige National Quality Award, European Quality Award, and Japanese Deming Prize and their criteria to see if they can provide insight into the quality movement and what is required for excellence. Each principle of TQM is also further studied to provide more insight into quality. The chapter concludes with a look into where TQM fits in with respect to management philosophies. This provides an introduction into the evolution of quality, one of the objectives of this research.

3.2. Background – Quality and TQM

Porter and Tanner state that in the last two decades, many organisations have experienced a period of great change in their markets and operations. International competition has meant that many organisations have had to face an increasingly turbulent and hostile environment. Customers have become more demanding, competition has become more intense and sophisticated and the pace of technological change has quickened (Porter and Tanner, 1996, p.1). As a result, many organisations adopt TQM in response to these forces.

Zeithaml (1990, p.2) and Ross (1994, p.90) believe that quality has become increasingly important in the business environment as it provides a competitive edge

to those organisations that implement it. They believe that quality is one of the main factors that contribute to organisational success and organisation growth.

Cortada (1995, p.6) and Balachandran (2004, p.144) agree that there are many definitions for quality; however, they state many authors accept the notion that the customer defines quality. They believe quality is what the customer says it is and is measured by the extent of satisfaction of the customer and not what the provider says it is. Ross states that TQM is a body of practices defined by both quality theorists and practioners. It can be defined as the integration of all functions and processes within an organisation to achieve continuous improvement of the quality of goods and services. The goal is customer satisfaction (Ross, 1994, p.1). Porter and Tanner (1996, p.1) maintains that TQM has an effect in every aspect of the business and becomes engraved into every single process. It is a business approach that focuses on improving the organisation's effectiveness, efficiency, and responsiveness to customers' needs by actively involving people in process improvement activities.

Various authors agree that TQM is based on a number of ideas. The term 'customer' in TQM is expanded beyond the traditional definition to include everyone who interacts with the organisation's product or service, either internally or externally to the organisation. TQM encompasses employees and suppliers, as well as the people who buy the organisations' products or services. It means thinking about quality in terms of all functions of the organisation to integrate interrelated functions at all levels of an organisation, a systems approach that considers every interaction between the various functions of the organisation. Thus, the overall effectiveness of the organisation is improved by more than the sum of the individual outputs from the subsystems. The subsystems include all the organisational functions in the life cycle of a product, such as design, planning, production, distribution, and field service. To implement quality effectively, there must be collaboration among all functions of the business activities, including market surveys, research and development, product planning and design, subcontracting, manufacturing, inspection, sales, and customer service, as well as financial, personnel, and educational activities. Every individual in the organisation must be involved, from top management to supervisors and production workers (Ozeki, 1990, p.3; Ross, 1994, pp.1-3; Smit, 1999, pp.50-53).

Kanji (2000) and Drummond (1992) assert that TQM is a continuous process and involves designing a timeless culture and organisation, always committed to customer satisfaction. There are two strands to this - careful design of the product or service and ensuring that the organisation's system can consistently produce the design. These objectives can only be achieved if the whole organisation is oriented towards them – hence the term 'total' quality management. Hellsten and Klefsjo (2000) define TQM as "a management system in continuous change, which is constituted of values, methodologies and tools, the aim of which is to increase external and internal customer satisfaction with a reduced amount of resources".

The definition of TQM in this research combines the classic definition with the modern:

> A management system that integrates all levels and functions within an organisation to achieve continuous improvement of the quality of goods and services, the aim of which is to increase external and internal customer satisfaction.

With TQM defined, the applicability of TQM needs to incorporate both manufacturing and service organisations as IT organisations may display elements of both. Service organisations can be defined as those which deliver their products personally to the customer – for example, banks, hotels, hospitals, and schools (Drummond, 1992, p.91). In manufacturing organisations the customer is remote, whereas in service organisations producer and consumer meet face to face. IT organisations are both manufacturing and service. They may develop products, but may also deal directly with the customer when developing projects. It is therefore necessary to obtain some background knowledge of how quality in service organisations should be handled. Service organisations present special problems of management. These include (Drummond, 1992, p.94-96):

- Managing service delivery – service quality is affected not just by the fitness of the product, but also by the manner of delivery. Service organisations have no product with exact specifications.

- Perishability – planning services requires careful matching of capacity to demand, and this can be difficult to achieve. Unlike manufactured goods, services cannot be stored.
- Interaction between producer and consumer – interaction effects perceptions of quality. Different interactions, good and bad, must be dealt with differently. Different strategies exist for different situations, e.g. a disaster can be turned into triumph by overcompensating the customer with apologies and gifts.
- The intangible nature of quality – service quality is a highly subjective issue and differs from person to person.

Zeithaml (1990, p.1) explains that virtually all organisations compete to some degree on the basis of service. Considering that the main focus of TQM is customer satisfaction, its implementation provides a greater edge against competition. Balachandran (2004, p.143) describes that as organisation executives find it increasingly difficult to establish sustainable, technology-based competitive advantages (innovations can be duplicated and technologies are not exclusive), they should direct more attention and resources to the quality of service and the manner in which it is delivered. A service such as TQM may provide a truer source of superiority. Some authors indicate that leading organisations are obsessed with service excellence as they use services to be different, to earn the customers loyalty, fan positive word-of-mouth advertising, and to seek some shelter from price competition (Zeithaml, 1990, p.2; Balachandran, 2004, p. 143).

TQM, as defined in this study, incorporates managing quality in all organisations. With IT firms being, manufacturers and service providers, the difference between organisations (manufacturing or service), will not be referred to.

The discussion served to complete the view on quality in the organisations (more information about managing quality in service organisations can be found in Appendix D). With TQM defined for this study, the various components of quality to be examined at each organisation can be sought. These are derived from various quality management entities and the principles of TQM.

3.3. Quality Management Entities

Quality management entities provide insight into elements of quality and how quality initiatives can be implemented. Porter and Tanner (1996, p.5) explain that many organisations' introduction to quality has been via the quality systems route, e.g. ISO 9000. The South African Bureau of Standards (SABS) certifies organisations using ISO 9000 standards to provide organisations with a competitive edge and enhance customer satisfaction (SABS, 2006). There is still an increasing global trend towards registration to the ISO 9000 quality standards. Whilst this trend reflects the continuing importance of quality and the need to be recognised as a quality organisation, these is external quality audits can degenerate into bureaucratic procedures, which limit themselves to assessing the formal aspects of the quality system, making no attempt to analyse the key strategic opportunities for improvement. Some organisations, therefore, regard these standards as a preliminary qualification and only the first step on the road to quality (Porter and Tanner, 1996, p.5).

A description of various quality management entities (standards, awards, prizes) provides a different view of quality and introduces measures that may need to be examined at the selected IT organisations.

3.3.1. ISO 9000 Standard

The term ISO 9000 refers to a set of quality management standards set up by ISO (International Organisation for Standardisation). For some organisations, it has become an international reference for quality management requirements in business dealings. The ISO management system refers to the organisation's structure for managing its processes or activities that transform inputs of resources into a product or service which meet the organisation's objectives, such as satisfying the customer's quality requirements, complying with regulations, or meeting environmental objectives (ISO, 2006). Porter and Tanner (1996, p.6) believe it is one of the most widely used quality frameworks, a useful first step, but is not a fully comprehensive business excellence framework such as TQM. ISO 9000 can make a contribution to

business improvement when used correctly; however, it can result in a bureaucratic system that constrains the organisation if not. ISO 9000 is the most limited in scope of all the quality frameworks (Porter and Tanner, 1996, p.7). McAdam and McKeown (1999, pp.229-242) state that the main benefit of ISO 9000 is that it should produce an effective quality system that will assist in eliminating errors and therefore save money on rework and scrap, etc. by building in quality at every stage, therefore improving customer satisfaction. It is claimed to provide marketing benefits, as certification to ISO 9000 demonstrates an internationally recognised level of quality. ISO 9000 when used correctly is one of many paths towards TQM implementation. McAdam and McKeown found that the organisations that were gaining most from TQM had started with ISO 9000, focused on external measures (e.g. customer satisfaction, etc.) as well as internal measures (scrap, efficiency, etc.).

McAdam and McKeown (1999) also found that the majority of organisations experienced benefits from implementing ISO 9000 and were five times more likely to experience some benefits from ISO 9000 than none. They also did some research on ‘life for organisations after ISO 9000’. They found that the most frequently occurring benefit was `fewer customer complaints', which should be expected if organisations implement ISO 9000 properly. Also, increased productivity was experienced by 37% in the organisations. In addition to this, the study showed that a significant number of organisations experienced internal benefits, e.g. reduced costs (23%) and greater control (14%) (McAdam and McKeown, 1999, pp.229-242).

3.3.2. ISO 9000: 2000 Standard

ISO first published its quality standards in 1987, revised them in 1994, and then republished an updated version in 2000. These new standards are referred to as the "ISO 9000 2000 Standards". Praxiom (2005) believes this new standard aims to improve the overall performance of an organisation’s processes even further. It is stated that ISO 9000:2000 builds on ISO 9000 by institutionalising the right attitude by supporting it with the right policies, procedures, technologies, resources, and structures. It helps establish a quality attitude by creating a quality system. This may be the first step in achieving a world-class standard.

This new standard seems to move away from a bureaucratic system to one that is more of a management philosophy, just as TQM is. The eight principles in the new standard are (Praxiom, 2005):

- focus on your customers;
- provide leadership;
- involve your people;
- use a process approach;
- take a systems approach;
- encourage continual improvement;
- get the facts before you decide; and
- work with your suppliers.

These principles seem to take some important elements out of TQM and provide a starting point for the overall culture change needed for continuous quality improvement.

Costa and Lorente (2004) studied how well ISO 9000:1994, ISO 9000:2000, and TQM go together. The results show that initially the standard helps some organisations reorganise their procedures and define responsibilities and duties. However, only product quality improves after implementation and none of the influential aspects such as the "soft" dimensions of leadership and human resource management found in TQM necessary for organisations. These aspects were not included in ISO 9000:1994 but they are in ISO 9000:2000. Their study points out that, in practice, ISO 9000:1994 and TQM are two parallel quality systems in an organisation. To get better results, it is important to adapt ISO requirements to facilitate TQM implementation; otherwise, the only advantage of the registration is the "permission" to sell in the market. ISO 9000:2000 makes this adaptation easier and closes the gap between the two parallel quality systems making ISO 9000:2000 more of an organisation base for TQM (Costa and Lorente, 2004, pp.20-31).

3.3.3. The Malcolm Baldrige Quality Award

The Malcolm Baldrige National Quality Award (MBNQA) is administered by the National Institute of Standards, which is a branch of the US Department of Commerce. The award was created in 1987 and the first winners were announced in 1988. Przasnyski (1999) describes that each year up to two organisations may win the award in each of the three categories of manufacturing, service and small business (fewer than 500 employees). There is a four-stage application review procedure, including a site visit, and awards are evaluated on an absolute scale, so if in a particular year no organisation achieves the required standard, no award is made.

Przasnyski (1999, p.391) and Porter and Tanner (1996, p.58) claim that meeting the criteria for the award is not an easy matter and the framework deserves a more detailed description to gain more knowledge into some TQM principles. The Baldrige Award represents the development of a holistic TQM framework and well-defined assessment processes. The award criteria have been requested by over 25 countries that run their own award programmes and countries such as Australia, Singapore, and Dubai have adopted this framework. Many states in the U.S.A. (United States of America) have also modelled their own quality awards and criteria on the MBNQA (Przasnyski, 1999, p.391; Porter and Tanner, 1996, p.58). The criteria have three important roles in strengthening the U.S.A. competitiveness; these are to (Porter and Tanner, 1996, p. 58):

- help improve quality performance practices and capabilities;
- facilitate communication and sharing of best practices; and
- serve as a working tool for managing performance, planning, training, and assessment.

The framework has three basic elements as shown in Figure 1. The heart of the framework is the “system” categories that control the processes which in turn deliver the “goals” of superior customer, marketplace, and business performance. The senior management leadership drives the systems themselves.

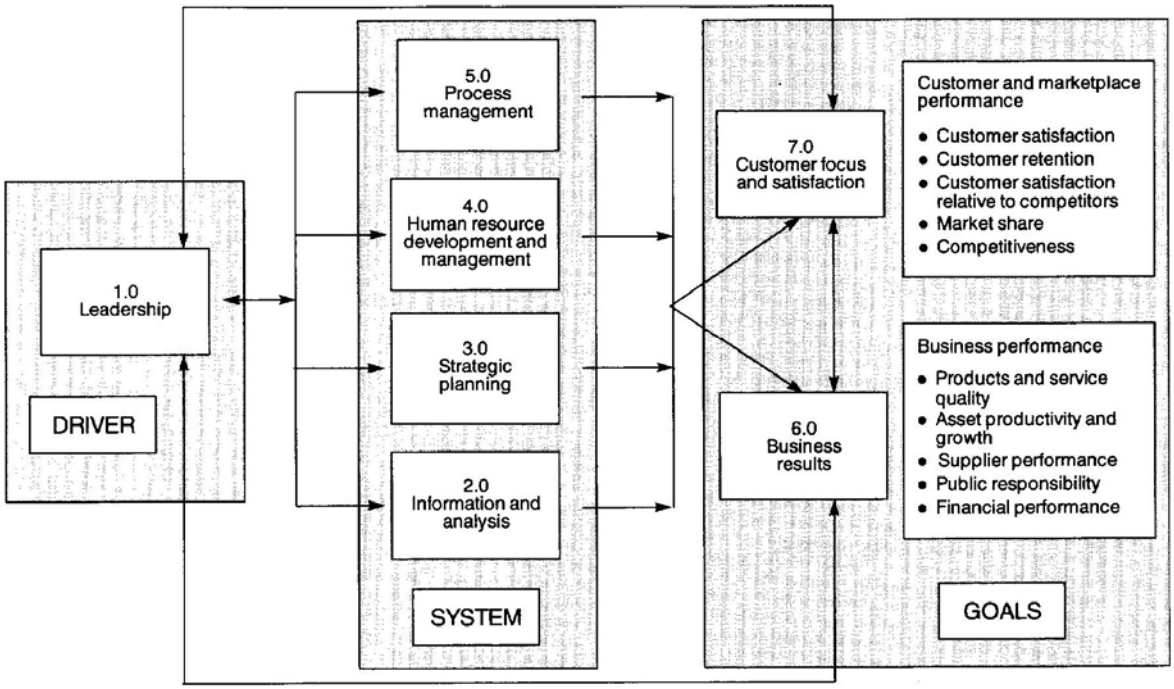

Figure 1: 1995 Baldrige Award Criteria Framework

The award currently evaluates organisations on the following seven factors (Balachandran, 2004, p. 152):

- Leadership – looks at the way senior executives guide the organisation and how the organisation addresses its responsibilities to the public as a good corporate citizen.
- Strategic Planning – looks at how it sets strategic direction and key action plans.
- Customer and Market Focus – looks at how it determines requirements and expectations of customers and how it acquires, satisfies and retains customers.
- Information Analysis – looks at management and analysis and improvement of data and information to support key organisational processes and performance management systems.
- Human Resource Focus – looks at how the workforce is enabled to develop its full potential and how the workforce is aligned to organisational benefits.
- Process Management – looks at how the key production and delivery and support processes are designed, managed, and improved.
- Business Results – looks at the performance and improvement in key business areas, customer satisfaction, financial and marketplace performance.

Przasnyski (1999) believes the award has set a national standard for quality in the U.S.A. The award's core values, concepts, extensive scoring guidelines and weightings are updated and revised annually to reflect current thinking. The 1996 and 2006 award criteria can be seen in Appendix E. They are freely available and provide a detailed road map for organisations' quality management efforts (Przasnyski, 1999, pp. 391-401). Some authors claim that corporations use the criteria as a basic management guide for quality management programmes. It has effectively created a new set of standards – a benchmark for quality in U.S.A. Industry and is a widely used framework in existence (Przasnyski, 1999, pp. 391-401; Stoner, 1994, p.18; Ross, 1994, p.13; Porter and Tanner, 1996, p.8).

3.3.4. The Deming Prize

The Deming prize was established in Japan to recognise excellence in the implementation of organisation-wide quality control. A total quality framework has been established for the award process that enables an organisation's relative achievement of quality control to be assessed against a series of quality criteria. Porter and Tanner (1996, p.8) assert that despite the high profile of the Deming prize, there has been ignorance in the West surrounding how judgements are made and what weightings have been given to the different categories. It is also not known how assessors are trained. This has made it difficult to transfer the framework and assessment processes to an internal assessment system. This is not examined or used in this study.

3.3.5. The American Quality Centre Benchmarking Awards

Porter and Tanner (1996, p.8) maintains that the American Productivity and Quality Centre Benchmarking Awards are probably least known of all the awards. They are included because the practice of benchmarking is growing at a tremendous rate. These awards recognise benchmarking excellence and provide a platform for organisations to distribute their knowledge, share best practice and further improvement of

organisations. Benchmarking is only a single characteristic of TQM and although benchmarking is examined in this study, these award criteria are not. Benchmarking Awards' criteria share common processes to the Malcolm Baldrige criteria.

3.3.6. South African Excellence Model (SAEM)

The South African Excellence Model (SAEM) is an awards programme run by the South African Excellence Foundation (SAEF) to recognise outstanding achievements in the field of organisational performance excellence. The SAEM is a diagnostic self-assessment tool that allows organisations to identify their strengths and areas for improvement, and to score their performance against internationally recognised criteria for performance excellence (SAEF, 2005).

The SAEM was developed using the Malcolm Baldrige Model (USA) and the European Foundation for Quality Management (EFQM) Model (Europe) as the points of departure. Malcolm Baldrige Quality Award guidelines are a mixture of theories developed by Crosby, Deming, Feigenbaum, and Juran i.e. based on TQM. This implies that SAEM is also based on TQM (Gardner, 2005).

3.3.7. The European Quality Award

The European Quality Award is based on a framework of the European Foundation for Quality Management's European Model for TQM. The concept of the model is that customer satisfaction, people satisfaction, and a favourable impact on society are achieved through leadership driving policy and strategy, people management, resources, and processes leading ultimately to excellence in business results. The model was the first framework to place emphasis on business results, financial and nonfinancial. Porter and Tanner (1996, p.9) state that the award is very similar to the Baldrige process.

3.3.8. Six Sigma

Six Sigma is a quality management programme that measures and improves the operational performance of an organisation by identifying and correcting defects in the organisation's processes and products (Wikipedia:Six Sigma, 2005). The central idea behind Six Sigma is that if it is possible to measure how many "defects" there are in a process, it is possible to systematically work out how to eliminate them and get as close to "zero defects" as possible. This is similar to certain elements in the philosophy of TQM. The term “zero defects” was first introduced by Crosby (1984) and it was Deming and Juran who emphasised statistical quality control.

Stat-A-Matrix (2005) explains that both the Baldrige criteria and Six Sigma are built on continual improvement. Unlike Baldrige, which is an assessment vehicle - a way of measuring the effectiveness of a quality system and its business results, Six Sigma is a way of raising the effectiveness and improving business results.

Six Sigma employs some of the same tried-and-true tools and techniques of TQM. Both Six Sigma and TQM emphasise the importance of top-down support and leadership. Pyzdek (2001) believes that both approaches make it clear that continuous improvement of quality is critical to long-term business success. Six Sigma, nevertheless, seems to be more specific with the guidelines that management should follow for improvement. It makes implementing quality easier because it is more defined and encapsulates some of the TQM principles.

3.3.9. Investors in People (IiP)

Investor in People (IiP) is an international standard that sets out a level of good practice for the training and development of people to achieve business goals (Bankseta, 2005). It recognises people as the greatest asset of an organisation and is used as an effective business tool for harnessing the full potential of all employees by motivating and deploying them throughout the organisation. Some discovered benefits of IiP can be seen in Appendix F.

IiP expands on one of the important principles of TQM that is, human resource development. The benefits of both systems are similar and organisations that utilise IiP philosophy should have superior human resource management.

3.3.10. Conclusion

Used correctly, quality standards such as ISO 9000, Malcolm Baldrige National Quality Award, Six Sigma, and South African Excellence Model may make a significant contribution to business improvement. The goals of TQM such as customer satisfaction, continuous improvement, and organisational excellence are dynamic targets and TQM frameworks can serve as a guide and benchmark to those goals. Table 1 briefly summarises the considerations taken in choosing which entity should be incorporated in this research.

Table 1: Quality Management Entities' Breakdown

Entity	Based On	Incorporated In Other Entities	Info Freely Available	Easily Understood	Using in Research
ISO9000	Quality Management Principles	X	X	X	
ISO9000:2000	Quality Management Principles		X	X	X
Deming Prize	**Malcolm Baldrige**	X			
Malcolm Baldrige Quality Award	Quality Management Principles		X	X	X
American Quality Centre Award	Benchmarking	X			
European Quality Award	**Malcolm Baldrige**	X			
South African Excellence Model	**Malcolm Baldrige**	X			
Six Sigma	Specific Quality Management Principles	X	X	X	
Investors in People (IiP)	Human Resource Management	X			

The eight principles from ISO 9000:2000 are incorporated in this research and are combined with the pioneers' theories to continue forming the basis for TQM. The

Malcolm Baldrige Award is, however, the most influential in this research and helps to determine the core principles of TQM. This award seems as a benchmark of TQM excellence as many other models and awards are derived from it (Deming Prize, SAEM, European Quality Award). It has also been chosen because of its detailed criteria which highlight core concepts throughout an organisation, internally and externally, and are freely available. The Baldrige criteria change yearly and reports from as early as 1989 to 2006 are analysed. More and more focus is being placed on financial performance (45% in 2006 vs. 15% in 1989), but this is not being discussed as a principle of TQM because it may be an outcome of applying TQM. The 1996 criteria are used in this study because only 25% (see Appendix E) of the results are dependant on business performance.

The quality management entities discussed are general to organisations in any industry. There are other entities that are more specific to the IT industry. Because this study focuses on IT industry organisations, these quality management entities need to be examined to complete the view of possible quality implementation methods. These may provide insight into concepts that need to be examined at the selected organisations.

3.4. Quality Management Entities – IT Industry

This section details the quality management entities, which are considered as modern approaches towards quality management in the IT industry. These may highlight trends in the IT industry, with regards to quality.

3.4.1. Capability Maturity Models Integration (CMMI)

Carnegie Mellon (2005) defines Capability Maturity Model Integration (CMMI) as an approach for organisations that provides essential elements for effective process improvement. It can be used to guide process improvement across a project, a division, or an entire organisation. CMMI helps integrate traditionally separate organisational functions, sets process improvement goals and priorities, provides

guidance for quality processes, and provides a point of reference for appraising current processes. CMMI is being adopted worldwide, including the Americas, Europe, and Asia. The CMMI model improves upon previous quality entities in many ways. CMMI best practice enables organisations to do the following (Carnegie Mellon, July 2005):

- explicitly link management and engineering activities to their business objectives;
- expand the scope of and visibility into the product life cycle and engineering activities to ensure that the product or service meets customer expectations;
- incorporate lessons learned from additional areas of best practice (e.g., measurement, risk management, and supplier management);
- implement more robust high-maturity practices;
- address additional organisational functions critical to their products and services; and
- fully comply with relevant ISO standards.

CMMI is a modular approach for implementing quality standards throughout an organisation. This is because of the five levels of CMMI that the organisation develops on through time. CMMI is derived from TQM ideas (Carnegie Mellon, 2005). Considering this, the greater the level of CMMI, the more TQM principles are being applied. CMMI has the advantage of being able to guide process improvement across projects, not only entire organisations. This is important in the IT sector as many organisations take on unique big projects for clients. CMMI helps give a quality standard for each project.

To illustrate the similarities between quality management entities, Carnegie Mellon University (2005) states that a level three organisation in CMMI would have little difficulty in obtaining ISO 9000:2000 (discussed above) certification. This is because both CMMI and ISO have their roots in TQM.

3.4.2. Information Technology Infrastructure Library (ITIL)

ITIL (the IT Infrastructure Library) is a standard in the area of IT service management (ITIL, 2005). ITIL provides a cohesive set of best practice, drawn from the public and private sectors internationally. It contains comprehensive publicly accessible specialist documentation on the planning, provision and support of IT services. ITIL consists of a series of books giving guidance on the provision of quality IT services, and on the accommodation and environmental facilities needed to support it (OGC, 2005). Benefits of this approach include (ITIL, 2005):

- improved quality of IT services and bottom-line results;
- cost justifiable service quality;
- services that meet business, client, and user needs;
- documented roles and responsibilities;
- integrated, centralised processes; and
- IT processes aligned with corporate governance requirements.

Stoller (2005) explains that the key contribution of ITIL is that it establishes a practice called IT Service Management (ITSM). ITSM translates into a set of services that become a common language between the business and IT. In unmanaged environments, users tend to see IT as a hodgepodge of laptops, software components, servers, storage devices, routers, wireless devices, and online services. ITSM seeks to change this by managing these resources comprehensively towards the delivery of simple, recognisable services.

ITIL has been developed in recognition of organisations' growing dependency on IT. This is a relatively fast paced and more modern field and because of this, TQM does not cover the IT service of organisations in detail. TQM does, however, cover quality in service organisations and the need for an appropriate IT infrastructure, whatever it may be at the time. Stoller (2005) states that ITIL has derived from the same principles used by Deming, this translates into its origin being from TQM. With the help of IT best practice frameworks such as ITIL, organisations can get better value out of their IT resources, and meet the needs of user and business stakeholders more directly. Considering this, ITIL is a better defined policy than TQM regarding IT

service management. Nonetheless, organisations would still benefit from TQM as it addresses more of an overall management philosophy for continuous improvement rather than the specific operation of IT service delivery.

At the moment, ITIL is the international best practice approach, providing comprehensive guidance on how to manage the delivery and support of IT services (Melliar, 2004). Over 100,000 IT professionals in the western world are ITIL-certified, and IT leaders such as IBM, HP, and EDS have standardised their service operations according to ITIL (Stoller, 2005). Dubie (2004) explains that a recent survey done by International Network Services (INS) found that the adoption of ITIL continues to grow and shows the framework second only to in-house practices as the method used most often to manage IT service processes. It also highlights that of those organisations not using ITIL, just over half plan to adopt it. The study also comments on the fact that of the organisations using ITIL, 86% say the framework is critical to achieving process management goals. Another study done by Forrester Research through to 2008 predicts that there will be widespread adoption of ITIL best practices by internal IT departments - from around 13% of large organisations in 2004, to around 40% in 2006 and 80% in 2008. They see ITIL being adopted and used across the world as the standard for best practice in the provision of IT service delivery (Fry, 2005).

3.4.3. COBIT

The Control Objectives for Information and related Technology (COBIT) is a set of best practices (framework) for information management. COBIT provides managers and IT users with a set of generally accepted measures, indicators, processes, and best practices to assist them in maximising the benefits derived through the use of information technology and developing appropriate IT governance and control in an organisation. In 1998, COBIT became the internationally accepted framework for IT governance and control.

The first edition was published in 1996 and the current, fourth edition in December 2005. COBIT has more recently found favour due to external developments. In its 4th

edition, it has 34 high level objectives that cover 215 control objectives categorised in four domains: Plan and Organise, Acquire and Implement, Deliver and Support, and Monitor and Evaluate. The framework explains how IT processes deliver the information that the business needs to achieve its objectives. This delivery is controlled through 34 high-level control objectives, one for each IT process, contained in the four domains. The framework identifies which of the seven information criteria (effectiveness, efficiency, confidentiality, integrity, availability, compliance and reliability) as well as which IT resources (people, applications, technology, facilities and data) are important for the IT processes to fully support the business objective.

3.4.4. Conclusion

Quality management initiatives may be approached in various ways. Organisations need some sort of structure to support business process, goals, and means of providing customer satisfaction. Different methodologies and standards for the IT industry include:

- CMMI for control and structure in software (and system) development;
- ITIL for operational and tactical management of service delivery; and
- COBIT as an overall IT governance framework.

These methodologies might provide a modern view of quality implementation, different terminology used cannot deny that many of the underlying principles strain from TQM and strive towards similar thoughts. To a certain extent abandoning the comprehensive management philosophy of TQM, the new standards provide a modern approach to incorporate new business trends, replacing or building upon individual TQM principles and providing more detail on specific topics. Which framework, model or standard an organisation uses is heavily reliant on the organisation's structure and needs.

There have been other quality management entities used and studied in the field in South Africa. For a comprehensive list, refer to Appendix G. These were adapted from a provider of IT service management training and mentoring (Melliar, 2004).

The table in the referred appendix illustrates the key aspects of each entity summarising what the entity is, its objective, and the potential outcome of each. This research does not include the quality management entities (awards, standards, prizes, IT entities etc.) directly in investigating the organisations. A more general approach, in the form of TQM, is needed to approach organisations, as these entities may be too specific. This insures a variety of aspects can be examined at each organisation.

Quality as defined in this research and as seen from the pioneers and various quality management entities are used to develop a framework for TQM in this research. Each contribution cannot be weighed equally and particular emphasis is given to the MBNQA criteria and weightings for the structure, confirmed by the principles of ISO 9000:2000 discussed in the previous section, as well as the theories for content into the criteria. These core principles can be found in "disguises" in other quality management practices. The universal principles discussed in turn are:

1. Top Management Involvement;
2. Information Systems;
3. Strategic Quality Planning;
4. Human Resource Development and Management;
5. Management of Process Quality;
6. Customer Focus and Satisfaction;
7. Management Structure and Teams; and
8. Cost of Quality.

The selected organisations are examined on these eight principles. Further information is obtained on each principle by means of a literature survey. Each principle is examined in detail at every one organisation to provide the information required to assess an ability of the organisation as to the particular principle.

3.5. Top Management Involvement

Total quality begins with a strategic decision that needs to be made by top management and then a strategic plan constructed and worked down throughout the entire organisation i.e. at all levels of the organisation (Zeithaml, 1990, p.4; Crosby,

1984, p.7; Ozeki, 1990, p.9). Some authors maintain that visible and active support from the top could well be the difference between success and failure (Harrington, 1991, p. 28; Powell, 1995, pp. 15-37; Ahire, 1996, pp.23-56; Crosby, 1984, p.59; Ross, 1994, p.34). This is because leadership of management is the input to all processes in an organisation and total quality concentrates on quality performance in facets of the business to achieve and maintain a competitive advantage. Top management sets goals, policies, plans, and human organisation - all critical to the TQM planning process (Zeithaml, 1990, p.2; Ross, 1994, p. 90; Harrington, 1991, p.26; Deming, 1982, p.13). This does not mean that employees are not important in the quality transformation, but they are not the instigators of quality.

Ross believes management must form a role model figure that is visible, committed, and knowledgeable because an organisation's culture reflects the atmosphere portrayed and set by top management. Management must not reveal emphasis on budget and business plans even though important, but must communicate the values, continuous leadership, and philosophy of quality clearly throughout the organisation. Top management must examine the organisation's culture and, if it is found poor, management must change their own thoughts about quality and portray a newer, clearer image to the employees (Ross, 1994, pp. 33-43). For this to be successful, management themselves must have a clear understanding of TQM principles and theories.

Reimann (1991, pp.8-11), director of the Malcolm Baldrige National Quality Award, has reviewed hundreds of applications, including those of the award winners. His review of key excellence indicators of quality management is insightful and helpful. A summary of the characteristics of excellent top management involvement can be found in Appendix H.

Management or leadership of TQM is a vital ingredient in implementing it. True TQM leadership builds a climate for excellence that prevails over operational complexities, external market pressures, or any other impediments to quality that might exist (Zeithaml, 1990, p. 4). Two important aspects of leadership are the way employees and management communicate throughout the organisation and the culture they form.

3.5.1. Communication

Communication is defined as the exchange of information and understanding between two or more persons or groups (Ross, 1994, p.37). This shows communication is not the issuing of commands and should not be one-way (Juran, 1992, p.38). For understanding to come about, the sender needs to get feedback that the receiver understands. When the receiver such as an employee is involved in the quality process, providing ideas, suggestions, and alternatives to top management, it can further enhance the feedback.

Some authors claim that due to the structural nature of organisations, communication between levels of management and the employees is a key to successful quality implementation. The success of any human enterprise may depend on how effectively people communicate with each other. Management's vision of quality needs to be portrayed correctly throughout the organisation. Top management as well as managers and supervisors at all levels serve as translators and executors of top management's directive (Jeffries, 1992, p.153; Ross, 1994, p.37).

Jeffries explains that from an employee's point of view, the introduction of TQM and the change involved is usually accompanied by feelings of anxiety, discomfort, fear, trepidation, and uncertainty. The sooner the organisation adopts effective two-way communication and not only enters into a dialogue about what TQM is, the sooner TQM will be achieved (Jeffries, 1992, p.37). The organisations and its managers must also listen to the expectations, fears, reservations, concerns and aspirations of their employees and realise how TQM is compatible with meeting those expectations and eliminating those fears. Jeffries (1992, p.155) further states that getting TQM started requires people to understand what TQM is about, how it affects them, what the vision is, and what will it mean for them. In addition, everyone in the business needs to know the direction of the business, what decisions are being made at senior levels, the reasons for those decisions, and how they will be affected personally. Communicating all of this is an ongoing process and is a message that needs permanent reinforcement.

This research takes into account the importance of two-way communication and feedback by including it as points to evaluate organisations on.

3.5.2. Culture

Ross defines culture as the pattern of shared beliefs and values that provide the members of an organisation's rules of behaviour or accepted norms for conducting operations. It is the philosophies, ideologies, values, assumptions, beliefs, expectations, attitudes, and norms that knit an organisation together and are shared by employees (Ross, 1994, p.40). The culture formed must create an organisational infrastructure consistent with continuous quality management. This culture needs to be instilled into the personalities of the employees and quality needs to be an entire organisation's goal and not just that of management. An organisation's basic beliefs need to be communicated effectively so that there is a general value system transformation. Creating a quality culture within an organisation is increasingly recognised as one of the primary conditions for the successful implementation of TQM (Kanji, 2000, p. S979).

Kanji describes that it is also necessary to have a culture that is ready and open to change. Therefore, one of the prime aims of TQM is a continuous improvement of the processes and products. Continuous improvement engages a change. For that reason, if employees are not open to a change, the chances of TQM's success diminish significantly (Kanji, 2000 p. S979).

Building a quality culture involves reversing fundamental assumptions about managing organisations. Instead of change within the system, it is the system itself that must be changed. Drummond (1992, p.18) states that assumptions such as the concern for short-term profits must be reversed. He states that the TQM imperative is customer satisfaction and the argument is that if organisations pay sufficient attention to quality, profits will follow, whereas if they concern themselves solely with profits, they will bankrupt themselves. Kanji (2000, p.S979) discovered that organisations with adaptive quality cultures geared to satisfy the changing demands of customers,

employees and shareholders outperform organisations without such a culture by increasing their sales up to three times more. Therefore, a successful organisation needs more than just sound business strategy; it needs a quality culture to support that strategy.

Ross (1994, p.41) found that successful organisations have a central core culture around which the rest of the organisation revolves. The culture of an organisation must guide the employees so that no employee forgets about quality, and it must be taught because quality means different things to different people. Quality must not be merely stated, but embedded in the organisation by management (more information on management as enablers of the TQM process can be seen in Appendix I). The basic vehicle for embedding an organisational culture is a teaching process in which desired behaviours and activities are learned through experiences, symbols, and explicit behaviour (Ross, 1994, p.41). Demonstration by top management is essential and must run along teaching, as the practices explained and taught must be exhibited throughout the organisation. Some categories of behaviour that may be looked for are (Ross, 1994, pp.41-42):

- signalling – making statements or taking actions that support the vision of quality, such as mission statements, creeds, or charters directed toward customer satisfaction;
- focus – every employee must know the mission, their part in it, and what has to be done to achieve it. When all functions and systems are aligned to support quality culture, everyone is more likely to support the same vision; and
- employee policies – instead of rewarding output or profit etc., rewards and promotion systems can be based on quality. This links to aligning all employees including managers to a single quality goal.

Employees follow strong management and leadership with clear categories of behaviour and are able to see and be a part of quality in practice. Some components of the quality system that provide cultural change are listed in Figure 2. Quality must become a habit and form a routine part of the way the business is run. Employees then take some responsibility away from top management as quality becomes engraved in every level of the business. The revised, increased quality culture provides a more

comfortable working environment and a base for success of the business, making management's goal of continuous improvement easier. Considering the culture affects so many aspects of a business, it is incorporated in this research. Aspects such as planning, organising, control, and communication outlined in Figure 2 are included.

Focus	From traditional	To quality
Plan	Short-range budgets	Future strategic issues
Organize	Hierarchy—chain of command	Participation/empowerment
Control	Variance reporting	Quality measures and information for self-control
Communication	Top down	Top down and bottom up
Decisions	Ad hoc/crisis management	Planned change
Functional management	Parochial, competitive	Cross-functions, integrative
Quality management	Fixing/one-shot manufacturing	Preventive/continuous, all functions and processes

Figure 2: Cultural Change Mechanisms (Source: Ross, 1994, p.42)

3.5.3. Research Findings

Yusof and Aspinwall (2000) did a study on critical success factors for TQM implementation conducted in UK small and medium enterprises. Involvement of top management and leadership was found to be the most critical factor for TQM implementation as every organisation investigated stated that as the number one factor (Yusof, 2000, pp. S448-S463). This was further enforced by three different studies done by Powell (1995), Ahire (1996), and Agus (2000). Collectively, they discovered that without the involvement and commitment of senior management, it is unlikely that quality enthusiasm and improvement programmes could be introduced and sustained. Studies of successful TQM programmes show that top management has made a whole-hearted commitment to the concept and implementation of total quality, and this commitment has filtered down through the entire organisation (Agus, 2000, pp. S808-S820).

Another study was done by Juhl et al (2000) to determine the way that top management, human resource (HR) system, manufacturing system and performance

are related and whether this relationship is dependent upon different cultures. Using data from the UK, representing one culture, and Australia and New Zealand to represent another, it was indicated that a universal structure between the four business components mentioned existed, and that this structure was independent of the cultural setting within the areas chosen for this study. It was found that the quality of management was unconditional, while the probability of both a high-quality HR system and a high-quality manufacturing system was conditional upon top management. Finally, the level of performance was conditional upon the joint effect of the quality of the HR system and the quality of the manufacturing system. This study adds to the fact that TQM starts and continues with the attitude and involvement of top management.

3.5.4. Conclusion

Top management with regards to quality must be active, obvious, and informed with continual education of employees to facilitate two-way communication and a quality culture. Therefore the link between top management involvement and quality is a key aspect of this research. Many questions are formed to try determine exactly how top management have an impact on quality and quality culture (quality policies, communication, involvement).

Concentrating on the various aspects of culture highlights the view that quality culture affects many areas of an organisation. Emphasis is placed on determining whether a quality culture is practiced at the selected organisations (attitudes, beliefs, visions etc. about quality).

3.6. Information Systems

Quality programmes within an organisation are dependant on information systems. This section investigates the characteristics of information systems and their link to TQM. Information systems refer to information analysis and information technology.

Cortada (1995, p.15) explains that for years, information technology (IT) was justified solely on its ability either to reduce operating expenses (through automation of work) or to help people make decisions. IT can now be used as a tool to support quality activities. If an organisation uses process improvement or reengineering as the primary strategy for quality improvement, then information technology has an important role to play. This could include monitoring, storing information in databases (useful in executing tasks or processes important to the customer), and, they can shorten lines of communication, improve two-way communication, and speeding up processes. IT can create these benefits (Cortada, 1995, pp.16-18):

- Shorten lines of communication and improve two-way communication using electronic mail and report generation.
- Applications can be designed to make sure the right information is at the right place at the right time.
- Computers can gather data on transactions and also on how processes are doing (effectiveness).
- Computers help increase awareness of the environment using benchmarking.
- Computers make it possible to provide new or additional services to both internal and external customers.
- Computers can give a fuller view of customers and clients and provide any links between processes and clients.
- Computers improve efficiency of services and operations such as tracking repair services.

Information is the critical enabler of TQM (Feigenbaum, 1983, p.827; Ross, 1994, p.61). Ross explains that to implement quality procedures step by step into the business until the entire organisation has quality processes requires information at each step of the way. Proper information systems can track and improve areas laid down by the principles of TQM. Further internal information is needed about each division in an organisation and where problems exist. Information systems may become the most important means for organisations to create distinctive quality and unique service at the lowest possible cost and allow the TQM process to function. Information is critical to all functions, and all functions need to be integrated by information (Ross, 1994, p. 62). Information systems (IS) could include improving

customer satisfaction with IS services, improving employee skills, implementing new systems faster, and applying state-of-the-art technologies. Some quality based IS activities are (Cortada, 1995, p.31):

- service to customers (internal and external);
- leadership involvement (rewards and inspects);
- continuous improvement (process focus);
- quality assurance (assessments);
- measurements (including self-assessments);
- supplier partnerships (shared management disciplines); and
- strategic quality planning (involves everyone).

Cortada (1995, p.31) and Ross (1994, p.62) claim that involving each of these attributes will make sure all the processes work, improve the effectiveness, improve the efficiency and change the culture of the organisation to a more quality orientated one.

3.6.1. Management of Information and Data

Ross affirms that the way in which an organisation selects the data to manage its performance is one of the building blocks of managing performance improvement. There can be a wealth of information available, but an organisation needs to analyse this data and distribute it correctly to the processes requiring it. The data selected falls into many types, for example customer related, product or service performance, supplier performance, cost, financial etc. (Ross, 1994, pp. 61-68).

Historically, organisations have automated the easy applications such as financial accounting and production control (Ross, 1994, p.62). Ross (1994, p.62) states that implementing TQM implies that instead of automating easy functions within an organisation, more focus is needed on information systems to improve processes. The development of these systems should integrate more functions. These systems should run simultaneously in parallel rather than sequential order to reduce cycle time, increase productivity, and produce fewer defects in products. TQM requires the

organisation to reengineer the processes for better efficiency so that more and more functions are integrated and work together instead of the older, separated style of functioning. In successful organisations, there are few key goals and each goal is linked to every level of the organisation in a well thought-out system. The award winners of the Malcolm Baldrige Award have had data-rich systems (Reimann, 1991, p.9).

Top management needs to be continuously involved in the quality process. With the aid of correct information; it improves their ability to make decisions quickly (Feigenbaum, 1983, p.99). The ability of obtaining information faster gives management at all levels more time for innovation and change.

Information can be further used externally for customer satisfaction, the ultimate focus of implementing TQM. Ross explains that this is done by using IT as a means in developing new products/services and maintaining that link between customers and their demands. The same attention should be spent on internal customers and their processes. Customer feedback is imperative for a more effective operating process. It is a good idea to design a system that measures the pulse of the market and the customer base (Ross, 1994, p.70).

Ross (1994, pp. 64-65) discovered that by spreading information, standardising information and measuring performance to get feedback of information within the organisation, organisations could shorten cycle time, improve quality and reduce costs.

3.6.2. Management of Supplier Performance

Porter and Tanner (1996), Reimann (1991), and Ray (1995) indicate that the process of effective supplier evaluation and working with suppliers is vital to the procurement process and a pre-requisite of a total quality output from the organisation. Total quality cannot be achieved without quality inputs. Organisations must form a partnership with their suppliers. This insures common quality communication and team work as opposed to placing orders at the cheapest available suppliers. Feedback

should exist between the customer, the organisation and the supplier. This identifies performance improvement areas because the suppliers may have customer feedback through the organisation and can then understand which areas need improvement (Porter and Tanner, 1996, p.73; Reimann, 1991, p.10; Ray, 1995, p.44).

Ray discovered that the current trend of outsourcing is continuing to rise. However, before activity can be contracted out, there needs to be careful consideration of its suitability and its impact on the organisation. Much of the Japanese success in manufacturing can be linked directly to processes of selection, supplier evaluation and managing its supplier base. Many supplier evaluation processes are question and answer based, whereby a positive response constitutes attainment. Many systems lack the rigour of further and detailed investigation and analysis (Ray, 1995, p.44). The key elements to be evaluated can be seen in Appendix J.

Effective supplier selection is a fundamental task of the buyer. A successful total procurement process stems from the investment of time and effort into the process of supplier evaluation (Ray, 1995, p.45).

3.6.3. Benchmarking

Reh (2005), Bicheno (1991), and Camp (1989, p.3) define benchmarking as a form of information that organisations use to analyse other organisations to improve their own. It is the process of determining who is the best, who sets the standard, and what that standard is. The essence of benchmarking is the continuous process of comparing an organisation's strategy, products, and processes with those of world leaders and best-in-class organisations to learn how they achieved excellence, and then setting out to match and even surpass it. For many organisations, benchmarking has become a key component in their TQM programmes and brings about an added competitive advantage (Camp, 1989, p.3; Ross, 1994, p.235). Benchmarking can also save costs as other organisations have already developed and implemented a system that works so it is cheaper to use it instead of developing a new system. Slight modification may have to be done, but the ideas are there to be utilised.

Jarrar discovered that benchmarking or best practice management is increasingly being recognised as a performance improvement effort for processes, business units, and for entire corporations. Well-run organisations and market leaders alike cannot afford to ignore this emerging discipline if they want to remain leaders in their respective markets (Jarrar, 2000, p. S734). Benchmarking is a criterion for the Malcolm Baldrige Award under "competitive comparisons and benchmarks" indicating its importance. The benefits of benchmarking include (Ross, 1994, p.239; Camp, 1989, p.3):

- Cultural Change – Benchmarking allows organisations to set realistic, rigorous new performance targets, and this process helps convince employees of the credibility of these targets. This adds to employee involvement.
- Performance Improvement – Benchmarking allows the organisation to define specific gaps in performance and to select the process to improve them.
- Human Resources – Benchmarking provides a basis for training. Employees begin to see the gap and know that doing something better does exist. Consequently, both commitment level and involvement increase.

To implement benchmarking into an organisation's common practice, management commitment, organisation communication, and employee participation are vital (Camp, 1989, p.6). It can be seen how the core principles of TQM are also needed for other performance approaches. This indicates that if TQM is focused on and implemented, other competitive advantages can be easily studied and implemented. Benchmarking still has the customer's requirements in mind. It is used to gain an insight into how other organisations are implementing procedures in a set industry that could be favourable for the customer.

Ross (1994) discovered that benchmarking and productivity also have a relationship. Benchmarking allows an organisation to concentrate on areas that need defining and true productivity is then derived when workers at all levels are solving problems of the business.

With this increasing importance of benchmarking, it is important that organisations have a `process' for collecting, assessing, validating, transferring and applying best

practices. Best practice transfer has potential to achieve benefits, and is too important to be left unmanaged (Jarrar, 2000, p. S741). Even if the organisations are leaders in a particular field, successful international organisations and organisations in other industries can be examined.

Concerning information systems and benchmarking, it is essential to measure any quality improvement to determine its effect on the system. Recording, monitoring, and measuring performance improvement is a feature of a quality drive (Jeffries, 1991, p.23). The measures are stored in an information system, easily accessible by employees to determine performance improvement and target areas.

3.6.4. Conclusion

Cortada (1995, p.19) states that quality practices are being adopted at an increasing pace by organisations of all kinds in the industrialised world. Information systems and technology may be central to the success of any organisation's quality implementation. IT provides the support necessary for the quality movement as an organisation's processes can be aided with the use of IS. Implementation of quality practices throughout the organisation requires the help of IS because technology can be applied in the redesign or improvement of many processes (Cortada, 1995, p.113).

The practice of benchmarking may be applied in any organisation as this provides a cost effective solution for obtaining working systems that can help any process researched. Considering it is an easier approach then redeveloping management processes and functions, it is the main focus in the information systems principle. Attention is also given to rating suppliers and how data is used in various developments.

3.7. Strategic Quality Planning

Strategic quality planning is defined by Juran (1992, p.300) and indicates the main concepts:

> "Strategic Quality Planning is a structured process for establishing long-range quality goals, at the highest levels of organisation, and defining the means to be used to reach those goals."

Juran and Ross state that the improvement of quality takes time and is implemented slowly through the organisation to be made successful. Strategic quality planning is required to implement quality correctly. There must be a quality-based strategy that is developed through a formal structured approach over time. Most successful organisations attribute their progress due to this type of strategy (Juran, 1991, pp.6-8; Ross, 1994, p.91). The strategic planning should be done accurately through programme and action planning so that when quality is implemented, it works effectively.

A quality-based strategy incorporates many other characteristics of TQM such as quality policies, plans, type of information required, organisational structure, and human organisation to create that quality culture within an organisation that succeeds (Juran, 1992, pp.303-313). It provides the basis upon which plans are developed and communication achieved. A basic rule of strategic planning is that structure follows strategy (Ross, 1994, p.91). The aim of planning is to ensure employee efforts are all clearly focused and well directed. It involves specifying requirements and procedures for all parts of production (Drummond, 1992, p.70). The pervasive role that quality plays in strategic planning can best be understood by examining the components of a strategy (Ross, 1994, pp.91-102):

- Mission – Primary overall purpose of an organisation and its expressed reason for existence.
- Product/Market scope – Marketplace research.
- Competitive Edge – Differentiation of products tailored to customer with high standards of product/service quality.

- Supporting Policies – Guidelines for action and decision-making that facilitate the attainment of objectives.
- Objectives – Set more specific objectives to identify the ends it hopes to achieve by implementing a strategy. These objectives are set differently in all departments so that each organisation division is striving for a goal, with all objectives following the main quality culture of the organisation.
- Organisational Culture – The core concept that the organisation is aiming to instil in the daily life of the business.

These components are developed through a process of strategy development.

3.7.1. Strategy Development

Ideally an organisation should have short-term (one to three years) and longer term (three or more years) planning processes for customer satisfaction, top management, and overall operational performance improvement (Porter and Tanner, 1996, p.68). The ways in which these processes are deployed throughout the organisation are important.

Strategy development covers matters regarding the development of the main strategies and business plans with a particular consideration given to the type of inputs that are used. Example inputs are (Porter and Tanner, 1996, p.69):

- customer requirements and the expected evolution of these requirements;
- projections of the competitive environment;
- risks such as financial, market, technological and societal risks; and
- the organisation's capabilities and its suppliers' capabilities.

Strategy development also covers how the strategies, policies, and business plans are translated into actionable key business drivers that serve as a basis for deploying plan requirements.

3.7.2. The Vision, Mission, Goals, and Policies

Porter and Tanner (1996, p.4), Ross (1994, p.104), and Drummond (1992, p.60) believe that successful organisations have a vision of their future with clear organisational goals that they strive towards. Policies need to be developed to bring this vision into the processes of the workplace. The vision is the starting point for all TQM initiatives and should state clearly what the organisation is trying to achieve. It acts as a beacon guiding and illuminating decision-making and action (Jeffries, 1992, p.61). In many cases, organisations fail to translate their vision and mission into actions that deliver improved performance (Porter and Tanner, 1996, p.4). A policy sets the atmosphere for quality planning (Drummond, 1992, p.60). The key to a successful translation is to understand in detail what the organisation needs to achieve to realise its vision and develop appropriate action plans. A quality vision statement makes explicit the organisation's approach to (Jeffries, 1992, p.61):

- customer satisfaction;
- organisational performance;
- product/service quality;
- how employees are treated; and
- social responsibility.

Jeffries believes that the vision can be a powerful force for positive change. This vision has to be produced by the top management within an organisation and cascaded down correctly to each employee and monitored (Jeffries, 1992, p.67). This links with implementing effective communication between management and employees. Top management is the only group that is in a position to decide the core values the organisation should adopt.

3.7.3. Benchmarking

Reimann (1991, p.9) maintains that benchmarking can be further used in long-term horizon planning. The planning process should understand where the organisation stands in respect to its competitors across a broad front. Quality planning does not

focus only on the performance of the product but on the delivery, packaging, and service. Many aspects can be analysed and measured to assess how important specific product and service features are to the customer. Benchmarking provides an insight into how the leaders and competitors are analysing and measuring these specific features. Benchmarking was discussed under information systems.

3.7.4. Conclusion

With quality introducing such a major competitive edge, strategic planning is required to plan the correct implementation of TQM within an organisation. An organisational culture based on quality, needs to be developed and this takes time and planning. Planning is the key to achieving conformity of quality and must incorporate every aspect of a process. No strategy can be effective unless it is carefully planned and then implemented. The business plan should integrate the quality goals, developed by top management, with complementary strategies.

The mission, goals, policies and aspects of strategic planning and development are incorporated in this research. The key is to try determining exactly how many elements of quality planning are considered at the selected organisations. Aspects such as human resource development, information development, and productivity improvement are examined in the frame of quality planning. This provides an overview of an organisation from a quality planning perspective.

3.8. Human Resource Development and Management

Ross (1994, p.121) states that quality improvement can result from a reduction in cost or cycle time, an increase in throughput, or a decrease in the variation within a process. It is true that many elements such as information systems or information technology aid this, but it is also true that human resource development and management adds value in all three cases. Human factors are one of the most important dimensions in quality and productivity improvement (Porter and Tanner, 1996, p.5; Ross, 1994, p. 119). Employees need a vision in which they can believe

and be a part of, an achievement culture that challenges them to be the best they can be, a sense of team that nurtures and supports them, and role models that can show them the way (Zeithaml, 1990, p.5; Reimann, 1991, p.10). Employees offer continuous improvement in the systems of the organisations making quality happen. Ross (1994, p.119) believes that one of the best ways to achieve organisational success is by educating, involving, and empowering employees at all levels. This creates tighter relationships between the business and the employee so the employees try harder to excel both themselves and the organisation.

TQM is fundamentally about change. For some organisations the change may be slight, but for other organisations the change may be much more significant. Inevitably, culture of the organisation, new skill sets, and management style do change. The one common denominator in this is people. Involvement, education, training, and rewards, recognition, benefits, and compensations are key aspects of human resource development and management.

3.8.1. Involvement

The involvement approach is based on the idea that organisations should be designed from bottom to top, so that employees are in control of their destiny and able to participate in the business of the organisation (Lawler III, 1992, p.1). Many authors indicate that employee involvement (EI) is one of the key features of human resource development and management (Porter and Tanner, 1996, p.1; Reimann, 1991, p.10; Lawler III, 1992, p.1; Ross, 1994, p.120). Employee empowerment and involvement and the energy that comes with feelings of ownership are necessary prerequisites for continuous improvement. An empowered employee focuses on results and is not inhibited by formalities of position, authority, or function, but believes that the organisation expects awareness of end results to be achieved and to be acted on. An empowered employee further believes in the expectations of the organisation and therefore takes the initiative to ensure the customers' needs are met. Empowered employees find solutions to problems, rather than the reverse. Balachandran (2004, p.191) stresses the importance that employees are urged to be included in the management process and it is made noticeable that their ideas are considered and do

impact the running of the business. Managers should encourage employees to participate in activities such as problem solving. Employee knowledge can be an untapped resource and involvement may develop an employee's potential. Employees are at the front of most processes and can aid in continuous development of quality by suggesting ideas.

To participate in the business, employees at all levels need power, information, knowledge, and rewards that are relevant to business performance. Appendix K shows ways involvement can be created.

Lawler (1992) conducted a study of the Fortune 1000 organisations, to determine whether organisations had incorporated employee involvement (EI) into their approaches and the results that the EI efforts were producing for organisations. The results suggest that due to EI, life is better for employees (positive on employee outcomes such as worker satisfaction, quality of work life, and absenteeism), and operating results are better for organisations (positive for performance outcomes such as productivity, quality, turnover, and profitability) (Lawler III, 1992, p.61).

The study of the Fortune 1000 organisations was revisited in 1993 to provide more detail into how EI and TQM complement each other. The evidence found substantiates the close interrelationship and complementary nature of EI and TQM. They help make each other more successful (Lawler III, 1996, pp.6-11):

- Organisations with more extensive forms of employee involvement report higher outcomes from their TQM programmes than organisations with less employee involvement.
- Employee involvement programmes are more successful when they are used in conjunction with TQM programmes.

There is a particularly close link between the impact of production oriented TQM practices and the use of EI approaches. The impact of production oriented TQM practices is positive only when they are used in a manner that is highly participatory (Lawler III, 1996, pp.6-11).

The study also provides some interesting data on how TQM and EI programmes should be positioned relative to each other. Performance outcomes are highest if managers focus on TQM and see EI as part of it rather than the other way around. The highest impact is achieved if EI and TQM are managed as an integrated programme. Finally, using them both leads to better financial performance (Lawler III, 1996, pp.6-11).

3.8.2. Training, Education, and Overall Development

Many authors indicate that when management finally understand what comprises TQM and starts following the path to quality, it comes across the need to develop the employees in the organisation (Crosby, 1984, p.7; Juran, 1992, p.15; Feigenbaum, 1983, p.201). Education and training is the development of personnel in all organisational functions and levels. Employees are taught quality that contribute to the organisation's products. This is at minimum cost and consistent with full customer satisfaction (Feigenbaum, 1983, p.201). Education provides a common language of quality and employees begin to understand their role in the quality process, adding to the culture of quality within an organisation. Each employee needs to be exposed to a complete understanding of what quality means and how each can act to implement it (Crosby, 1984, p.160). Education and training requires an investment in time and money by the organisation involved in quality improvement, but it results in improvement (Crosby, 1984, p.116). Criteria that employees need to be educated on, as described by Crosby (1984), can be found in Appendix L.

Jeffries (1992, p.16) maintains that with TQM, training is geared to achieve one thing and that is improving performance. Trainers who work towards this become difficult to replace. The achievement of any organisation's commercial objectives is dependent more than anything else on the competence of the people employed (Jeffries, 1992, p.32). Training aids in lifting employees up to a quality understanding. Training examines aspects such as managing the organisation policy, how to gain commitment of the employees for the organisation and how to evaluate it. TQM involves: knowing about TQM, helping clarify the vision, spreading the word, working alongside

managers, acting as a training resource, and working as an internal consultant (Jeffries, 1992, p.40).

Balachandran (2004, p.187) believes top managers tend to neglect education and training when business is good. A continually healthy bottom line is an opiate that induces complacency. Customers are becoming more aware, more sophisticated, and more demanding. Their loyalties cannot be taken for granted and like TQM being a continuous process, employee development is too.

Jeffries (1992) performed a survey of 300 "improvement-driven" organisations to understand the implications for training departments. It was found that in traditional organisations, training often operates as a staff function separate from line operations and without performance metrics to assess quantitatively whether the training produces results in terms of organisational goals and plans. Typically, training in such organisations has limited customer focus and satisfaction measurements tend to be event based (for example, course evaluation forms). In high-performance organisations, the training function is closer to customers because training is "driven" by customers' needs, developed and designed in conjunction with customers, and evaluated continuously. When carried out properly, training and education enables both people and organisations to create more opportunities and at the same time make more of any opportunities that arise, which is essential in TQM (Jeffries, 1992, p.73).

Linde believes that fundamentally the training process is about helping people to learn and TQM involves learning at all levels. In high-performance organisations, training is emerging to play a critical, integrative role as a driver of cultural change, process alignment, job redesign, and continuous improvement. In a real sense, it is serving as a change engine to help generate an organisation's resilience and core competencies. Those are the success traits an organisation needs to compete effectively in a constantly changing, often-turbulent business environment (Linde, 1997, pp.20-26).

3.8.3. Reward, Recognition, Benefits, and Compensation

Reimann (1991) asserts the need for human resource plans that should be in place to address the needs of the entire workforce. Rewards, recognition, benefits, and compensation methods should be addressed towards quality. Quality is seen as one of the areas for recognition, in the form of celebrations and rewards. It is important that the senior executives give this recognition. The quality values need to be reinforced and celebrations or central quality initiative days do just that. Crosby states that it is good practice to give credit at the more local levels where the gains in quality are being made. It is also good practice to have the employees included in the nomination process. Those who receive the awards are deeply moved by being chosen by their peers. They would not have been so moved, nor would the rest of the people, had management alone made the choices. This provides the organisation with living, talking, and visible leaders in the quality initiative that the colleagues may look up to on a daily basis (1984, p.118).

3.8.4. Research Findings

Agus (2000) discovered that employee focus has a strong correlation with customer satisfaction criteria, the reason behind implementing TQM, which suggests a reinforcing impact of the critical role of human resource management in attaining higher customer satisfaction and organisational growth. Figure 3 presents the Spearman's correlation of TQM practices with customer satisfaction criteria. Principal TQM practices (customer focus, supplier relationships, training and employee focus) show strong correlation with customer satisfaction variables. Product quality and product features demonstrate high correlation with top management commitment, supplier relations, training and employee focus (Agus, 2000, pp.S808-S820).

TQM practices	Spearman's correlation			
	Quality	Feature	Delivery	Price
1. Management commitment	0.348*	0.404*	0.418*	0.144
2. Customer focus	0.292	0.206	0.355**	0.509**
3. Suppliers relationships	0.318*	0.304	0.194	0.231
4. Training	0.335*	0.317*	0.305	0.213
5. Employee focus	0.407*	0.453*	0.522**	0.360*

*$p \leqslant 0.05$, **$p \leqslant 0.01$.
All *t*-tests are one-tailed.

Figure 3: Correlation Between TQM Principles and Customer Satisfaction Variables (Source: Agus, 2000)

3.8.5. Conclusion

TQM has far-reaching implications for the management of human resources. It emphasises self-control, autonomy, and creativity among employees and calls for greater active cooperation rather than just compliance. These are positive things for both the individual and organisation and create a culture that is necessary for quality implementation and success. The successful introduction of quality systems must begin with an existing fund of quality attitudes, knowledge and skills, all introduced and managed by employee education and training. This research tries to ascertain if organisations are implementing any quality training and development.

Exchange of information and openness to employee suggestions should be made a dominant characteristic in the organisation when implementing TQM. By breaking down organisational barriers between management and lower level, some authors have found that employees' fears of informing superiors of any problems in their organisations are eliminated (Elmuti, 1995, p.86; Ross, 1994, p.120). Concurrently, participatory activities and communication contribute to the organisational goals of increased productivity and improved quality. Communication matters are also examined at the selected organisations.

TQM human resource development and management principles such as team-building, employee participation in problem-solving and decision making, sharing information, providing extensive education and training at every level in the organisation, and supportive top management often increase job satisfaction,

productivity, quality, and overall organisational effectiveness (Elmuti, 1995, pp.86-98; Lawler III, 1992, p.61). This can be seen by lower turnover, accident, and absenteeism rates (Reimann, 1991, p.10; Lawler III, 1992, p.61). McAdam and McKeown (1999) discovered in their research that top TQM organisations have high levels of employee participation and training.

The combination of involvement, participation, training, and education in human resource development and management towards quality are examined at each selected organisation to determine its level and effectiveness.

3.9. Management of Process Quality

Process management is a way of looking at how a business is managed. This section deals with the action planning and implementation of TQM. Once strategic quality planning has taken place and objectives, goals, and ideas set, quality needs be implemented. Talking about a quality culture is not sufficient; plans need to be executed. Management of process quality is an ongoing process that implements TQM throughout the organisation. The Baldrige Award examines the management of process quality as one of its criteria for TQM. It explains what is entailed and is defined as (Ross, 1994, p.143):

> "The management of process quality category examines systematic processes the organisation uses to pursue ever-higher quality and organisation operational performance. The key elements of process management are examined, including research and development (R&D), design, management of process quality for all work units and suppliers, systematic quality improvement, and quality assessment."

Ross (1994, p.144) states that it is apparent that this definition is directly related to how well the processes are managed – all of the processes in the organisation that contribute directly or indirectly to quality as the customer defines it. This management should be done continuously through all processes and not only selected ones.

Jeffries (1992, p.114) maintains that with TQM, the intention is to minimise non-value-adding activities such as error creation, error inspection, time wasting and maximise on value-adding activities such as error prevention, focused training, and getting it right the first time. Process management should incorporate these factors to produce a system that does these intentions.

Jeffries (1992) and Ross (1994) state that the traditional approach to quality control was product inspection of the final product. TQM implies process and quality control should be done over every process. Management of process quality ought to insure that this stringent continuous quality care is occurring to improve all business aspects.

3.9.1. Just-In-Time (JIT)

Certain leading Japanese organisations attribute their success in reducing waste and speeding production to the implementation of so-called ‘just in time’ methods of working (Drummond, 1992, p.120). Drummond (1992) defines JIT as a system which aims to produce and deliver finished goods just in time to be sold, sub-assemblies just in time to be assembled into finished goods, fabricated parts just in time to go into sub-assemblies, and purchased materials just in time to be transformed into fabricated parts.

JIT is just researched to complete the characteristics of TQM, but is not discussed any further and no organisation approached in this study is investigated with respect to JIT. IT organisations do not have the same need for JIT in their workplace, as it is usually not a production environment. More information about JIT can be found in Appendix M.

3.9.2. Quality in Project Management

Due to the nature of the IT industry, unique projects are undertaken and project management is a regular occurrence that needs to be addressed. Some IT organisations undertake large IT projects involving months of work and then even years of further monitoring and maintenance. The quality management role should be implemented differently based on project size, budget, and contractual requirements. On smaller projects, the quality management role may be integrated into the deliverer's responsibilities. On larger projects, the project team may include a quality assurance group, with an independent reporting relationship around the deliverer.

Jung and Wang (2006) explain that TQM alone may have a positive affect on project management. They investigated the association between the TQM practice and the continuous improvement aspect of international project management, as they found that a growing number of organisations were adopting project management as part of their management practices. The major finding of this study is that employee relation's elements are the most contributing elements towards achieving continuous improvement of project management. Investment made in employee training and development, efficient communication mechanisms, employee work environment flexibility and safety, and employee satisfaction, can make a significant contribution to project management. The study also suggested that top management makes the second largest impact. Management's leadership in commitment to quality through vision and strategy, organisation-wide quality culture, and objectives for quality performance, facilitates improvement of project management.

3.9.3. Conclusion

Once a quality strategy has been planned, it must be executed. Process management deals with actions of the organisation and what it is doing to initiate the quality movement and instil a quality culture.

Management of quality continually improves the functioning of the business as variability decreases and standards are raised. The customer notices the effort and

knows the organisation is serious about quality. Meeting the stringent characteristics of TQM is dependant on good planning, implementation, monitoring, and adjusting any discrepancies found. Strategic quality planning with management of process quality achieves just this.

This research aims to determine how organisations measure the level of quality, if organisations know the effectiveness of a quality initiative, if any, and if the organisations keep monitoring the quality initiative. This is done by determining if organisations have any TQM programmes, if employees have noticed any processes that have been simplified or made more effective, and if organisations review customer and employee inputs to improve quality.

3.10. Customer Focus and Satisfaction

Drummond, Ross, and Feigenbaum agree that quality begins and ends with the customer. Customer focus and satisfaction is the interaction that occurs between the customers, customer needs, and the business. Customers are the central focus of TQM and quality control enters into all phases of the production process, starting with customer's specification, the sale to the customer through design engineering, assembly to shipment of the product, installation, and field service; all making sure to avoid customer dissatisfaction. TQM is implemented to increase profitability and market share. This occurs because of an increased customer base due to satisfied customers (Ross, 1994, p.205; Feigenbaum, 1983, p.825; Drummond, 1992, p.13). Off all the Baldrige criteria, customer focus and satisfaction accounts for 25% of the 1996 points in the award, the most for a principle of TQM. The Baldrige Award describes this category (Ross, 1994, p.205):

> "This category examines the organisation's relationship with customers and its knowledge of customer requirements and of the key quality factors that drive marketplace competition. Also examined are the organisation's methods to determine customer satisfaction, current trends, and levels of customer satisfaction and retention, and these results relative to competition."

Balachandran (2004, p.142) explains that the way to increase competitiveness is to acquire product differentiation, which is reflected in quality. The better the quality, the more delighted the customer. Business after business is learning that 'delighting the customer' means (Balachandran, 2004, p. 142):

- fewer customers lost;
- less time and money spent putting things right for dissatisfied customers;
- less time and money spent on advertising and marketing to find new customers;
- less use of costly discounts and offers to attract new customers;
- more time to devote to anticipating and meeting the needs of the best customers; and
- free (word of mouth) publicity from the satisfied customers.

With respect to the Malcolm Baldrige Award, the biggest difference between applicants is the fact that the high-scoring organisations are proactive by customer expectations (Reimann, 1991, p.11). This is done by surveys, understanding implications of complaints, looking at product and service follow-ups, and by using and integrating listening posts. The bottom line is to have a clear picture of customer requirements.

3.10.1. Customer Satisfaction Determination

The organisation should understand how it determines customer satisfaction, customer repurchase intentions, and customer satisfaction relative to its competitors (Porter and Tanner, 1996, p.76). These processes ought to also be evaluated and improved.

Customer satisfaction determination also includes dissatisfaction indicators such as complaints, claims, refunds, recalls, returns, downgrades, repairs, warranty work, warranty costs, miss-shipments, and incomplete orders. Customers' needs and expectations can be monitored through (Balachandran, 2004, p. 162):

- market research and surveys;
- observation of customer behaviours and responses;

- data on offers from competition;
- complaints;
- personal contact with customers;
- focus groups; and
- comment/feedback from users.

Monitoring tries to identify critical areas of expectations, and see what elements can be built into either product features or processes to satisfy those expectations (Balachandran, 2004, p. 163).

3.10.2. Customer Satisfaction Management

Porter and Tanner (1996, p.76) insist that the organisation must manage its interactions and relationships with its customers. It should also use the information gained from customers to improve its customer relationship management processes. Processes should be set up to define key requirements for maintaining and building relationships. These requirements should be translated into key quality measures that may include responsiveness, product knowledge, follow-up, and ease of access.

Balachandran and Ross believe that customer satisfaction management deals with communication with customers to get their feedback and consequently improve quality. For instance, customer complaints can aid the process of finding the root cause of problems in different processes of the organisation. They should not be ignored because it is estimated that for every complaint a business receives, there are 26 other customers who feel the same way, but do not air their feelings to the organisation (Balachandran, 2004, p. 173; Ross, 1994, pp.206-207). It is by identifying these problems that can improve quality in the long-term making sure that it does not happen again.

Ross (1994, p.207) and Balachandran (2004, p.174) state that customer complaints are related to process variation. Both are undesirable and must be addressed. When a complaint is attended to quickly and taken seriously, the likelihood of further negative word of mouth is reduced. Repeated words of regret and compensation alone do not

satisfy. Complaints should not be avoided, but, in any event, dealt with to ensure that no other customers have the similar bad experience.

Customer satisfaction is the result of a three-part system (Ross, 1994, p.207):

1. company processes (operations);
2. company employees who deliver the product; and
3. service that is consistent with customer expectations.

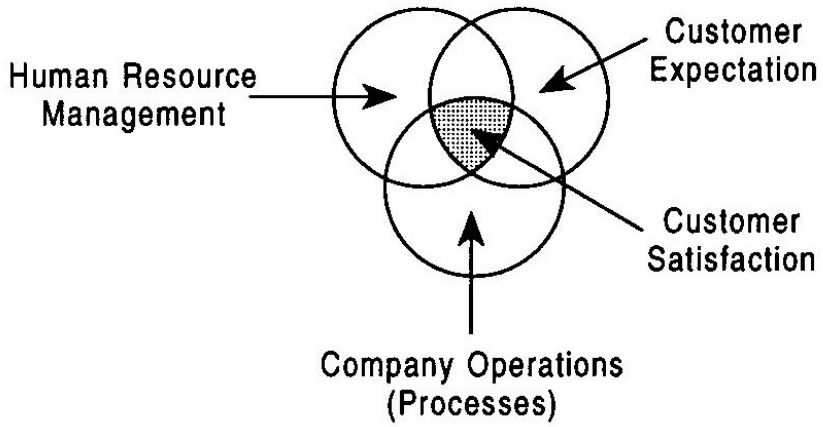

Figure 4: Customer Satisfaction: Three-Part System (Source: Ross, 1994)

The shaded part in Figure 4 represents the extent of customer satisfaction. Ross (1994, p.207) explains that the objective is to make all three circles converge into an integrated system. Like any system, control is necessary. Thus, standards are set, performance is measured, and variation, if any, is corrected.

This three-part model can be further extended for internal customers. It is just as important to satisfy customer needs internally as it is externally. This can prove to be quite tedious because what is good for the external customer might not be good for the internal customer. The solution is to determine the needs of both parties involved and design a process that would meet their expectations. Quality strategic planning should be done to create this balance.

3.10.3. Conclusion

The importance that customers obtain the desired product is recognised by Deming, Juran, and Crosby. Customer retention is an opportunity for organisations to provide continuous income. Ross (1994, p.216) estimates that customer defections can have a greater impact than economies of scale, market share, or unit cost. The issue of customer focus and satisfaction is a true quality focal point and both internal and external customers should benefit and raise the standards of the organisation. Agus (2000) discovered that effective TQM programmes assure that customers' needs are identified early in the process of designing and producing a product.

The concept of internal and external customers and aspects associated with each are included in this research to determine whether it is understood in the organisation. Internally, it is examined whether internal policies follow external customer requirements, whether organisations indeed take into consideration customer requirements and if those requirements are made aware to the rest of the organisation. Externally, whether customer policies such as warranties and complaints are examined and recorded, and used to improve customer perception. This is then extended to determine if any further commitments exist to customers.

3.11. Management Structure and Teams

This section describes an appropriate organisational infrastructure for the TQM process. It is directed more at internal customer satisfaction and links with the principles of customer satisfaction, human resource development, and top management involvement discussed earlier. Structure refers to the arrangement of responsibilities and functions (Balachandran, 2004, p. 164).

Balachandran explains that responsibilities and tasks should be assigned so that employees are clear on what they must perform. This adds personal attachment and ownership to processes, as nobody else will perform the task. This also increases ease of checking up on processes, to recognise, reward, or discover any areas that need

improvement. Responsibility achieves greater results because levels are more structured (Balachandran, 2004, p.164).

Balachandran further states that authority is needed to commit resources of the organisation i.e. a person with authority instructs people and issues orders. Authority directly influences the quality within an organisation so the structure must be planned to correctly place authority figures. The structure should be around specific customer needs and segments. Small units with responsibility for a clear customer group, equipped with essential resources to perform the tasks, and given clear performance objectives, function with a better sense of cohesiveness and perhaps with a healthy sense of competition. The structure should enable, not hinder, quick responses to unfamiliar and unexpected situations (Balachandran, 2004, pp. 164-165).

Feigenbaum (1983, p.824) and Ross (1994, p.263) believe TQM approaches more of a boundaryless, networked, and virtual organisation rather than the classical strict hierarchy. Synthesising quality values and polices into an employee's job and operation and developing a culture for correct quality attitude is a complex task that needs to be supported by an appropriate organisation infrastructure. This more networked, horizontal management approach is built on management commitment, employee involvement, and knowledge of internal suppliers. It has been found that the best way to ensure external customer satisfaction is to satisfy every internal customer at each step of the process (Harrington, 1991, p.26; Buzzell and Gale, 1987, p.116).

3.11.1. Organising for Quality Implementation

Balachandran claims that a quality infrastructure cannot be understood by looking at an organisation as a whole, but at the many activities that are done in the different departments. Once the activities have been noted and placed in perspective of the overall product/service process, key activities can be highlighted and more importance can be placed on them. Support activities should not be disregarded as they enable key activities to be performed. Different organisations have different key activities. The systematic way of identifying key activities is necessary for quality differentiation and, when grouping them into homogenous departments and functions.

Key activities impact on customers directly (Balachandran, 2004, p. 144). Figure 5 shows how some of these activities can add value to the customer.

Activity	Value to customer
Purchasing	Improved cost and quality of product
Engineering and design characteristics	Unique product
Manufacturing	Product reliability
Order processing	Response time
Service	Customer installation
Scheduling	Response time
Inspection	Defect-free product
Spare parts	Maintenance
Human resources	Customer training

Figure 5: How Activities Can Impact on Customers Directly (Source: Ross, 1994)

An organisation structure that corresponds to different homogenous departments based on key activities as opposed to the traditional departments such as accounting, marketing, and research & development, each of single function and non-interacting, is the most economic and effective way to deliver quality and therefore achieve a competitive advantage (Ross, 1994, p.269). Figure 6 shows the concept of organising for TQM. Inputs to the system are converted by organisation activities into an output. The objectives of the system should first be determined by top management and be aligned with the quality vision, quality goals, and quality strategies of the organisation.

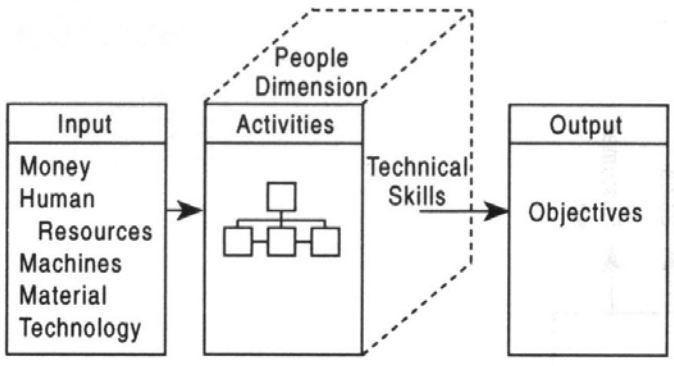

Figure 6: The Organisation System (Source: Ross, 1994)

Jeffries (1992, p.68) believes commitment to the organisation's vision should be emphasised. Appointing someone at the executive level with specific overall responsibility for quality can do this. This appointment has access to both top management and base level employees to smooth the quality goals and policies and improve communication throughout the levels of the organisation.

3.11.2. Teams for TQM

A critical component of TQM is employee involvement and the one on which the management system should be based (Ross, 1994, p.278). Human resource development and employee involvement were discussed earlier as a vital untapped resource (see section 3.8.1). Ross (1994, p.278) describes that to increase involvement and to generate new ideas constantly, quality teams need to be formed. These teams vary slightly among different organisations incorporating different levels of employees with varying tasks. Some of these may be quality councils, steering committees, cross-functional teams, quality improvement teams, task teams, self-managing work teams, and quality circles (Figure 7c). All are based on similar principles trying to involve employees, increase quality, improve operations, and optimise the efficiency and effectiveness of the total process. Quality circles are the most original form based on these principles. It is defined as a small group of employees doing similar or related work who meet regularly to identify, analyse, and solve product-quality and production problems and to improve general operations (Ross, 1994, p.278). This provides the core meaning for implementing teams for TQM.

A team approach to business process improvement provides long-lasting results and minimises implementation time (Harrington, 1991, p.55). This ensures quality within the entire organisation over the long term and aids in internal customer satisfaction. Harrington states that a quality team is the centre of the improvement activity and brings about new growth and increased productivity within an organisation. Its efforts bring about a new way of thinking about the business and the way each process functions. Process improvement teams bring increased effectiveness, efficiency, productivity, and profits (Harrington, 1991, p.62).

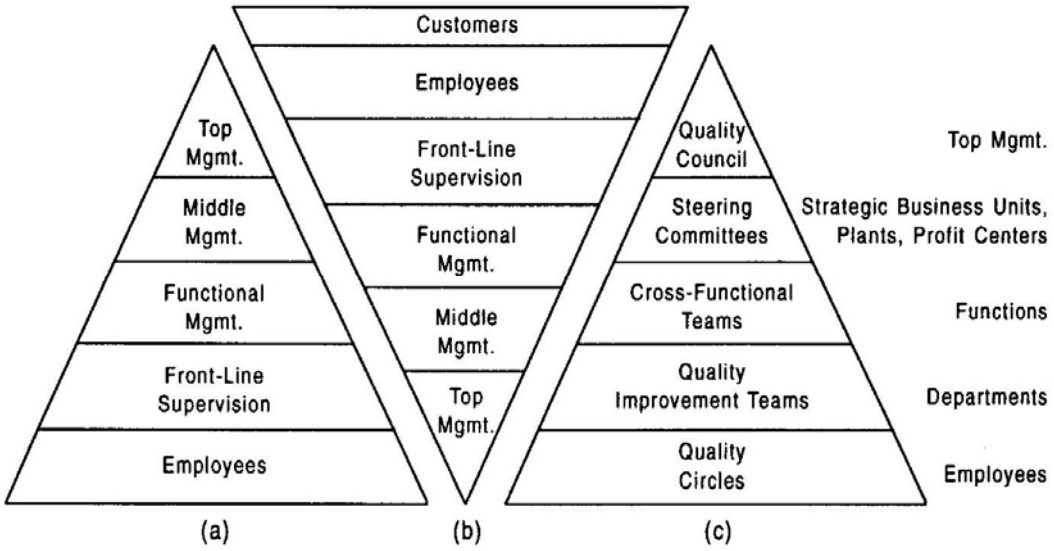

Figure 7: Transition from Traditional to TQM Organisation (Source: Ross, 1994)

Ross believes that organisational structure should incorporate the ideals of TQM. The organisational chart can be a starting point of making employees aware of a difference in culture. The traditional organisational chart has the chairman at the top and the cascading of authority to successive levels ignoring front-line supervisors and the employees (Figure 7a). In this model, it is the same people who are ignored that deliver the quality in the product or service. A new organisational chart should be declared in organisations with TQM management, as shown in Figure 7b. This does not change the hierarchy and flow of authority, just the degree of importance for management to focus on. The manager is now a facilitator, a coach, and an integrator, whose job is to remove barriers that prevent subordinates from doing their jobs (Ross, 1994, p.273). Quality is now the responsibility of everyone and not just the quality assurance department. Using this new organisational view, employees also become aware of their importance and can better understand their role in the organisation.

3.11.3. Reengineering

Balachandran (2004, p.213) states that Business Process Reengineering (BPR) is, by definition, an attempt to rethink the fundamentals of the business process in critical areas of performance, and to redesign the processes in ways that dramatically improve

quality of service, speed and cost. It reinvents the organisational structure. Reengineering recognises that the market may be turbulent, the customers are often unpredictable, competition can be ruthless, margins shrink, and life cycles of products are shortening. The context for BPR is nothing more than realities of change. The realities are (Balachandran, 2004, p. 216):

- nothing is simple anymore due to rapid and perplexing change;
- whatever organisations do should be quick and radical due to the speed of change;
- marginal or incremental adaptation is not enough; and
- organising should be around outcomes, not tasks.

BPR is not a prerequisite, but one way an organisation can go about changing its processes. The management philosophy developed in TQM can be a drastic change on the current organisation profile just as BPR can be. This research does not assess in which way organisations implement change. It is included here to complete the discussion on organisational structure and how organisations can implement change and hence TQM.

3.11.4. Conclusion

TQM approaches more of a boundaryless, networked, and virtual organisation making use of management and employee structures such as quality councils, steering committees, cross-functional teams, and quality circles. This thinking moves away from the classical, strict, vertical hierarchy where employees are only minimally involved and not deemed as important.

This research assesses whether any quality teams exist and whether any meetings are held to discuss quality aspects for improvement. It also tries to determine whether these teams and meetings are effective in improving quality.

3.12. The Cost of Quality

Quality is measured by the cost of quality (CoQ), which is the expense of non-conformance, the cost of doing things wrong (Crosby, 1984, p.64). Some authors are under the impression that the CoQ, or more specifically, "non-quality" is a major concern for organisations and there appears to be general agreement that the costs of not doing the things right the first time range between 20 and 30 percent of sales (Crosby, 1984, p.86; Bicheno, 1991, p.47; Ross, 1994, p.332; Jeffries, 1992, p.117). The potential for profit improvement is thus substantial.

Historically, it is assumed that increased quality implies increased cost, but as various authors discovered, this is not the case. Feigenbaum (1983) introduced the concept that quality is everyone's job and should be incorporated throughout the organisation in all activities. In 1979 Crosby (1979) introduced the concept that quality is free. Today, the view among practitioners seems to fall into one of three categories (Ross, 1994, p.333):

1. Higher quality means higher costs – the additional benefits from improved quality do not compensate for the additional expense.
2. The cost of improving quality is less than the resultant savings – the savings result from less rework, scrap, and other direct expenses related to defects.
3. Quality costs are those incurred in excess of those that would have been incurred if the product were built or the service performed exactly right the first time – this view is held by adherents of the TQM philosophy. Costs include not only those that are direct, but also those resulting from lost customers, lost market share, and the many hidden costs and foregone opportunities not identified by modern cost accounting systems.

Bicheno states that the cost of quality aims at the financial quantification of all activities involved in the prevention and rectification of defects. The cost of non-conformance or the CoQ should be calculated by organisations and used as a force for directed improvement because costs can now be brought to the attention of management. The CoQ pinpoints the source of quality costs and quantifies quality with money. Money is the "language of management" and quality can then be

followed and provide specific cost justification data for management (Bicheno, 1991, p.46). The costs of quality are generally classified into four categories (Feigenbaum, 1983, p.826; Jeffries, 1992, pp.118-119; Balachandran, 2004, p. 148; Bicheno, 1991, pp.46-47; Ross, 1994, p.334):

1. Prevention Costs – these include those activities that remove and prevent defects from occurring in the production process. These ensure poor quality is not produced.
2. Appraisal Costs – costs incurred to identify poor products after they occur but before shipment to customers e.g. inspection.
3. Internal Failure Costs – costs incurred in the production process e.g. machine downtime, poor quality materials, scrap, and rework.
4. External Failure Costs – costs incurred after the product is shipped e.g. returns, warranty costs, and the hidden costs of customer dissatisfaction and lost market share.

Bicheno believes that with the introduction of TQM, failure costs decline whilst prevention costs level out. This comes about because employees as well as management now participate and quality becomes the natural standard. Prevention requires initial but not continuing investment, and as a result costs stabilise. Total costs continue to decline all the way to the level of zero defects, so that the optimal is reached with perfect quality (Bicheno, 1991, p.47).

Implementing TQM decreases non-conformance costs and this is the key to increase profitability and gain market share. Prevention costs should be made a priority because it is much less costly to prevent a defect than to correct one (Crosby, 1987, p.67; Ross, 1994, p.336; Balachandran, 2004, p. 148).

It costs to implement quality, but weighed against the cost of non-conformance, there should be no hesitation to implement TQM. TQM can increase each activity's effectiveness to improve overall efficiency. This increased efficiency and the savings in cost of non-conformance, extrapolated over the longer-term, should add more motivation to implement TQM.

CoQ is included in this research to determine if management follow any monetary impact of implementing TQM. The four categories of costs are used to assess organisations.

3.13. Trends in Management Philosophies

This part is explored to gain an understanding of the relevance of TQM as a management philosophy for the contemporary organisation. Smit (1999, p.36) explains that a management theory is a group of assumptions put forth to clarify and contend with the productivity issue. There is no clear answer to this issue, so management experts put forward their own views.

Smit (1999, p.37) explains that the theories of management can be classified into two main schools of thought, namely classical approaches and contemporary approaches. At a certain point in time each of these theories was held to be the answer to the productive attainment of the goals of the organisation. No theory dominates the field of management. Instead, the eclectic approach – the practice of borrowing management principles from different theories as dictated by circumstances – is the state of the art in management theory and practiced today. Figure 8 shows the various management approaches on a timeline. These theories should always be seen against the dominant culture (economic, political, social, technological, ecological, and international) of their time (Smit, 1999, p.37). It can be seen that TQM is one of the more recent management practices.

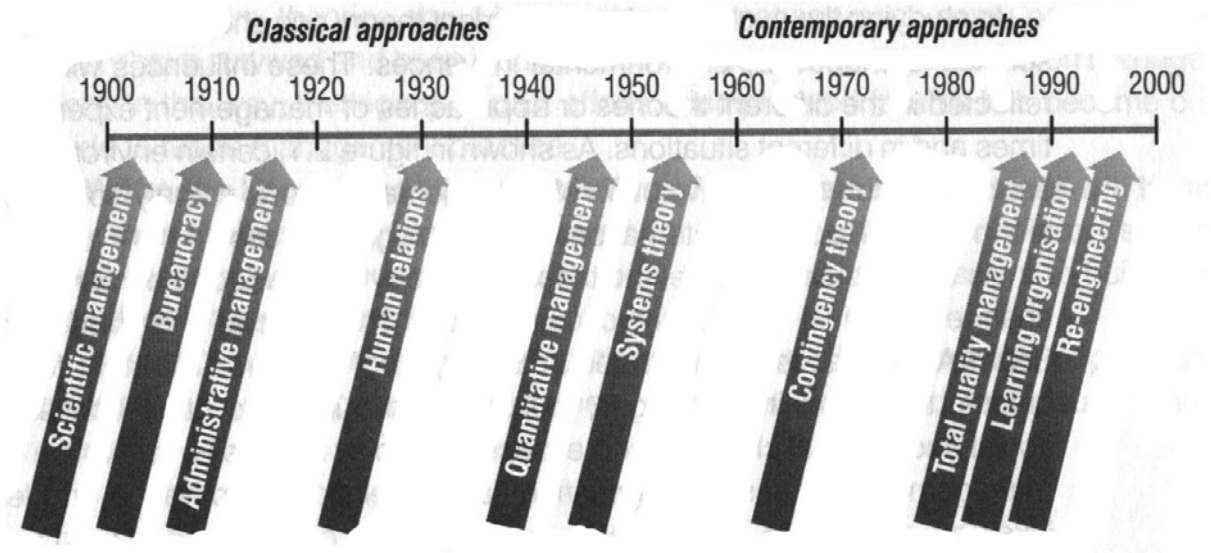

Figure 8: The Evolution of Management Theory (Source: Smit, 1999, p.38)

Smit (1999, p.47) maintains that the classical approaches to management provide the foundation for management and organisations as they function today. These approaches responded primarily to the pressing issues of their times, particular the need for internal efficiency. As time passed, international communication increased and multinational organisations became popular as trade alliances were formed. This increased competitive challenges and organisations were forced to alter management styles. This meant focusing on internal as well as external issues. TQM was one of the approaches that was developed for this. This can be seen in certain principles of TQM such as information systems (benchmarking against top multinational organisations) and customer focus (letting the customer change processes in the organisation).

It would be naïve to think that the evolution of management philosophy has stopped. Changes in the environment continually affect management approaches and trends in quality management should be researched. By virtue of the eclectic approach, this research investigates which TQM principles will remain and where TQM is bound for in the near future. It also tries to ascertain if organisations seek to implement TQM, understand any alterations, determine if any principles of TQM are no longer important, and if there are any new quality management philosophies being implemented at organisations. If so, they may be examined to determine its reliance on any TQM principles and why they have come about.

3.14. Conclusion

The principles of TQM, derived from the MBNQA and studied further through an in-depth literature survey, have been examined for this research. With different quality management entities discussed and further research on various principles done, it is possible to determine exactly what needs to be assessed at each organisation and what may arise. Each organisation is assessed on eight different principles. These are:

1. Top Management Involvement – includes culture, communication, and involvement.
2. Information Systems – includes benchmarking and supplier evaluation.
3. Strategic Quality Planning – strategy development, and the mission, vision, goals, and policies aligned with quality.
4. Human Resource Development – the education, training, involvement, and rewards and recognition of employees.
5. Management of Quality – implementing and guiding the quality initiative by measuring the actions of quality planning and changing processes.
6. Customer Focus and Satisfaction – systems in place to understand and assure internal (customer knowledge and policies) and external (feedback, warranties) customers satisfaction.
7. Management Structure and Teams – forming quality teams and the discussion and handling of quality with employees.
8. Cost of Quality – prevention, appraisal, and internal and external failure costs.

All eight principles are thought to be required for a complete TQM system. Certain dependencies may exist between some of these principles (management of quality would be harder without correct strategic quality planning, organisation resources for human resource development would be less plentiful if top management didn't see the need for customer satisfaction, with regards to quality, and hence were not involved). There is no set pattern for implementing and these principles may intertwine at various organisations as they best fit. The framework developed in this research and how closely related the principles are can be seen in Figure 9.

Trends in management philosophies were introduced to discuss the need to understand the evolution of TQM and how it may exist in the future. In this research,

the selected organisations are assessed with regards to the perceived trends in quality standards.

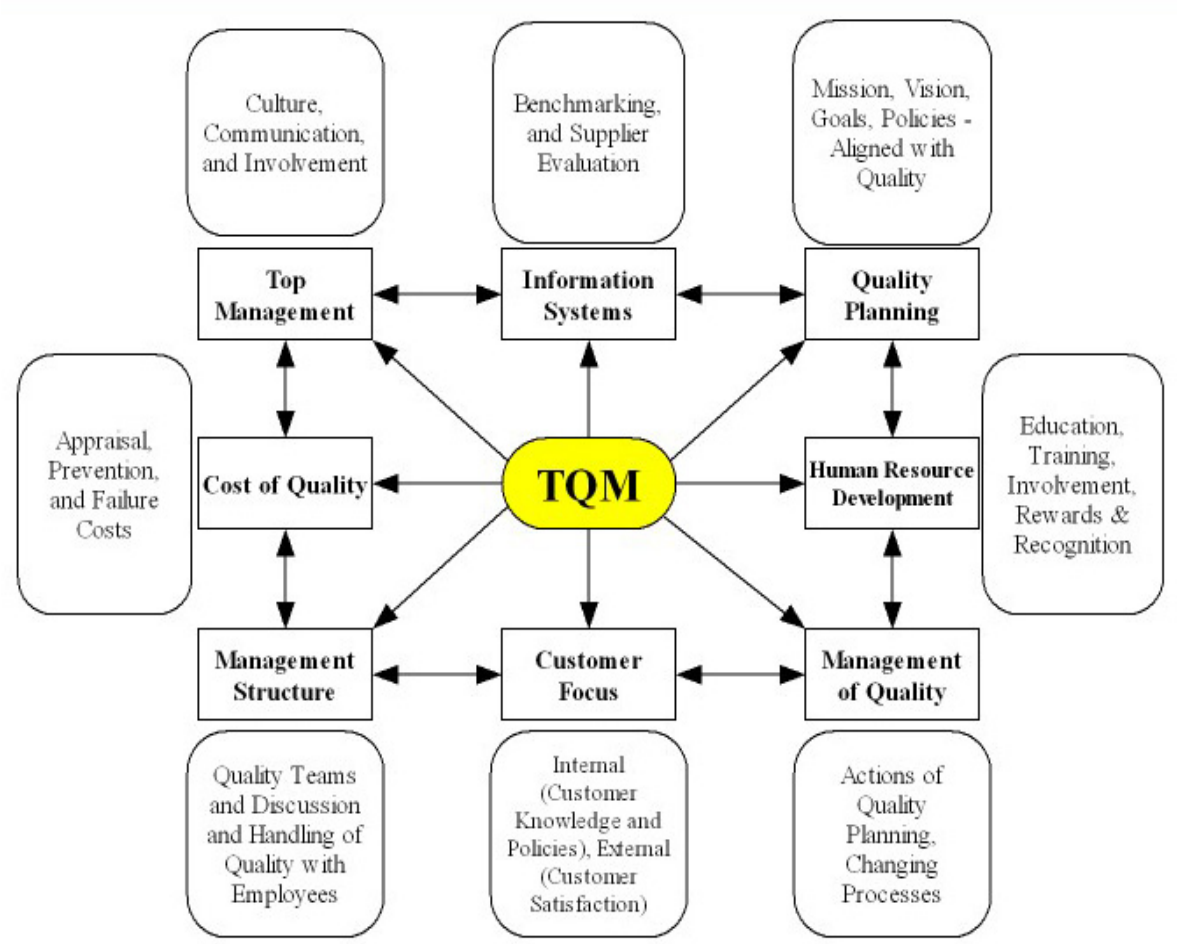

Figure 9: TQM Framework Used In This Research

Jeffries (1992, p.23) explains that once having established TQM, it needs to be measured and there have been various attempts to measure it based on:

- customer satisfaction;
- profitability/performance;
- product/service quality; and
- valuing employees.

The aim in this research is to measure the implementation of TQM based on the eight principles and asses it against financial performance (profitability/performance point above). The next chapter focuses on the various aspects of financial performance and the possible ways of measuring it.

Chapter Four: Financial Performance

4.1. Introduction

Financial performance can be defined as an organisation's ability to generate new resources, from day-to-day operations, over a given period of time and is usually gauged by net income and cash from operations (Definition:Financial Performance, 2006).

This research deals with listed IT organisations. These types of organisations are owned through shares (for a description of public limited organisations as a business organisation – see Appendix B). A share is one of a number of equal portions of the capital of an organisation and shareholders own the organisation through the purchase of these shares (Goodspeed, 2004, p.5).

According to Firer et al (2004), the cash payoff to owners of common stocks comes in two forms: capital gains (or losses) which arise through changes in the price of an organisation's shares; and dividends whereby shareholders are given a portion of the organisation's profits. Brealey and Myers (1991, p.675) state that a business has to deal with many different factors regarding corporate finance that affect financial performance. Such factors affecting capital gains (losses) and dividends could include areas such as capital budgeting, dividend policy, stock issue procedures, mergers and acquisitions, capital structure, and leasing. Some of these areas are discussed in Appendix N because they may have a bearing on the financial performance of organisations. In the end the financial manager should consider the combined effects of these decisions on the organisation as a whole. This chapter considers various ways financial performance can be measured.

4.2. Measuring Financial Performance

Financial data can be used to analyse an organisation's overall performance, assess its current financial standing, and determine any future potential (Goodspeed, 2004,

p.24). This chapter describes the financial indicators chosen to depict the financial situation of organisations, including selected financial ratios and any trends of these.

Goodspeed (2004, p.24) and Firer et al (2004, pp.21-30) stress that financial statements provide both descriptive and quantitative information about the organisation's current status and past financial performance. Descriptive information on the organisation's operating results over the past reporting period is provided by the chairman's, director's, and auditor's reports while quantitative information is contained in the income statement, balance sheet, and cash-flow statement. The income statement and balance sheet are used in this research as the source of information. Being listed organisations, this information is easily available.

Goodspeed (2004, pp.25-28) goes on to describe each financial statement. The income statement contains information on an organisation's income and expenditure over a period of time (past reporting period). The balance sheet is a snapshot of the financial situation of an organisation at a specific time. It is divided into two main sections: the source of funds (capital and liabilities) and the application of funds (assets). Various ways financial performance may be measured using the income statement and balance sheet are discussed.

4.2.1. Financial Ratios

Various authors indicate that financial ratios are an effective way of comparing organisations of different sizes and against the current industry trends, summarising large quantities of financial data, and comparing organisation's financial performances (Brealey and Myers, 1991, p.675; Firer et al, 2004, p. 57). A ratio seen in isolation has little, if any, meaning. However, its usefulness increases when it is compared to (Goodspeed, 2004, p.32):

- other ratios in the same set of financial statements;
- similar ratios in previous sets of financial statements; and
- a standard of performance such as an industry benchmark.

Financial ratios can be classified into six categories – sales, financial leverage, liquidity, asset management, profitability, and market value ratios.

All values used for the financial ratios are that specific organisation's year end income statement and balance sheet values.

4.2.1.1. Sales Ratios

Sales relate to the turnover of the organisation and can be found in the income statement. This is usually the first thing reported on because financial performance is usually gauged by net income and cash from operations (Firer et al, 2004, p.27). Percentage change in sales and percentage change in return on sales are used in this study for each organisation. These indicators are based on the assumption that an effective TQM programme retains the current customers and increases revenues.

The percentage change in sales is calculated year on year for each organisation, i.e.

$$\Delta Sales = \frac{Sales_t - Sales_{t-1}}{Sales_{t-1}}$$

$$where: t = a\ period\ of\ time\ and\ t-1\ is\ the\ previous\ period\ of\ time$$

Return on sales is the operating income divided by sales. Operating income is defined as the earnings before any interest and tax payments, also termed "operating profit" or "profit from operations". Lemak and Reed (1997) discuss the advantage of using operating income instead of net income to ascertain the impact on financial performance of TQM. They state that operating income is a better measure of performance than net income since it is not greatly affected by accounting methods, tax strategies, or financial structure. The formula for return on sales is:

$$\mathrm{Re}turn\ on\ Sales = \frac{Operating\ Income}{Sales}$$

4.2.1.2. Long-Term Solvency or Financial Leverage Ratios

Many authors indicate that these long-term solvency measures address the organisation's long-term ability to meet its obligations. These ratios also measure the capital structure of an organisation and indicate how heavily the organisation is or is not burdened in debt. This may be important because shareholders get only what is left over after the debt holders have been paid (Firer et al, 2004, p.60; Brealey and Myers, 1991, p.677; Goodspeed, 2004, p.34). No attempt is made to measure the financial leverage of the organisations in this study. It is assumed that since the organisations are listed for a minimum of five years, they are not burdened with debt.

4.2.1.3. Short-Term Solvency or Liquidity Measures

Firer et al (2004) highlight that short-term solvency ratios are intended to provide information about an organisation's liquidity. The primary concern is the organisation's ability to pay its accounts over the short run without undue stress (Firer et al, 2004, p.57). None of these ratios are used in this research because of their short-term nature. Current assets and current liabilities also often do not exist long enough for the two to get unmanageable. They also change fairly rapidly, so today's amounts may not be a reliable guide to the future (Firer et al, 2004, p.58). TQM is a long-term endeavour and so more long-term indicators are sought.

4.2.1.4. Asset Management Ratios

Asset management or activity/turnover measures deal with efficient use of resources employed in the organisation's operations (Goodspeed, 2004, p.33). Total asset turnover indicates the organisation's ability to generate sales from its total asset base (Goodspeed, 2004, p.34). This ratio is used to indicate asset management efficiency:

$$Total\ Asset\ Turnover = \frac{Sales}{Total\ Assets}$$

4.2.1.5. Profitability Ratios

Various authors dictate that profitability ratios are intended to measure how efficiently the organisation uses its assets and how the organisation manages its operations. The focus here is on the bottom line and profit generating ability of an organisation (Firer et al, 2004, p.64; Goodspeed, 2004, p.37). Return on equity (ROE) and return on assets (ROA) are the two indicators used to indicate profitability.

ROA relates net profit to sales. This measures the overall management efficiency of an organisation (Goodspeed, 2004, p.37). It is based on the assumption that implementing an effective TQM programme increases revenues. It requires net profit and total assets as the inputs. This can be seen in the formula:

$$Net\ profit\ m\arg in\,(ROA) = \frac{Net\ profit\ after\ tax}{Total\ Assets}$$

ROE indicates how effectively the organisation is being managed in the interest of shareholders. ROE is an important indicator of performance (Goodspeed, 2004, p.37). It requires net profit and total equity as the inputs. This can be seen in the formula:

$$\mathrm{Re}\,turn\,on\,Equity\,(ROE) = \frac{Net\ profit\ after\ tax}{Total\ Equity}$$

In this research, total assets are defined as all the assets of an organisation, current and non-current, as indicated on the balance sheet. Total equity is defined as total ordinary shareholder's funds. This includes capital and reserves and excludes minority interests. Minority interest consists of the minority portion of the subsidiary shareholder's equity and hence must be paid by the shareholders of the group organisation i.e. the main holding organisation (Feinberg, 2005, p.555).

4.2.1.6. Market Value Ratios

Goodspeed (2004, p.49) indicates that this is a type of relative valuation technique that expresses the price of a share as a ratio (multiple) of some quantity relevant to a shares' value such as earnings and book value. They are used to show how highly the organisation is valued by investors. These measures can only be calculated directly for publicly traded organisations (Firer et al, 2004, p.65). The most widely used market value measure is the price/earnings (P/E) ratio. It measures how much investors are willing to pay per Rand of current earnings. It takes into account the share price and earnings-per share (EPS) and may indicate which shares are undervalued and overvalued compared to each other and the JSE. It is not used in this research as it may indicate the organisation being dealt with. The other problem is that share prices may fluctuate daily yet the EPS figures used to calculate the ratio are obtained in the year-end financial statements, therefore resulting in incorrect P/E ratios or P/E ratios that do not best identify the current state of the organisation.

4.2.2. Share Price

The share price reflects the current value of the organisation from an investor's point of view (Dictionary, 2006). It is thought to be a stronger indicator of financial performance used in this study, as one of the goals of managers is to increase shareholders' wealth i.e. increase the current value per share of existing shares (Firer et al, 2004, p.10). Investors are continually analysing organisations and dealing in shares of that organisation. Because of this, they are buying and selling shares hence affecting the share price constantly.

4.2.3. Other Studies' Indicators

Other studies that attempt to link TQM to financial performance were analysed to determine how financial performance could be measured.

Eriksson (2003) used: change in sales, change in return on assets, change in return on sales, change in total assets, and percentage change in number of employees.

In Singhal and Hendricks (1997, 1999, 2001), six indicators of the financial performance were used to illuminate the impact of TQM. These were: change in sales, change in return on assets, change in return on sales, change in total assets, change in number of employees, and change in operating income.

Easton and Jarrell (1998) also use similar indicators, net income, operating income, sales, and inventory. Table 2 provides a summary of previous studies' indicators to evaluate the impact of TQM on the financial performance.

Table 2: Previous Studies' Indicators to Measure Financial Performance

	Change In Sales	Return on Assets	Return on Sales
Erksson	X	X	X
Singhal & Hendricks	X	X	X
Easton & Jarrell	X		

	Change in Assets	Change in Employees	Operating Income
Erksson	X	X	
Singhal & Hendricks	X	X	X
Easton & Jarrell			X

4.3. Conclusion

The six financial indicators chosen to measure the financial performance of the organisations are:

1. percentage change in sales;
2. percentage change in return on sales;
3. total asset turnover;
4. return on assets (ROA);
5. return on equity (ROE); and
6. percentage change in share price.

All the indicators chosen do not reflect original values i.e. if the total assets figure is known, it would be easy to identify the organisation. For the sake of anonymity, financial ratios and percentage changes are used. These financial indicators chosen closely resemble that of those used in previous studies.

Three of the indicators chosen are financial ratios dealing with profitability and asset management, two of the six financial indicators take into consideration the turnover of organisations, and the remaining indicator incorporates the share price. This is thought to provide a balanced view of the financial performance at each organisation. The next chapter's aim tries to introduce the association between quality and financial performance.

It is noted that unlike TQM, financial performance is well understood (although the use of historical values e.g. on balance sheet needs some explanation). This is why there is such a difference between the TQM and the financial performance sections.

Chapter Five: Quality and Financial Performance

5.1. Introduction

The previous chapters introduced and defined the concepts of TQM and financial performance. This chapter approaches TQM by analysing any associations between quality and profitability, productivity, market share, and price performance. These factors are examined because each may affect financial performance and each may be affected by quality initiatives. References are made throughout the chapter to current and previous international studies performed.

The Malcolm Baldrige National Quality Award is placing more emphasis on financial performance than before (Chapter 3.3.10 and Appendix E). Specifically, the award that recognises corporate quality achievements now further emphasises financial data in setting priorities for performance improvement, and also relies more on financial results in identifying quality practices. Considering this, the association between quality and financial performance is examined, and findings on links between quality and financial performance discussed.

5.2. Quality, Profitability, Market Share, and Competitiveness

Buzzell and Gale (1987) maintain that there are two basic ways to try do better than a competitor. The first one is to achieve superior perceived quality by developing a set of product specifications and service standards that more closely meet customer needs than competitors. The second way is to achieve superior conformance by being more effective than the competitors in conforming to the appropriate product specifications and service standards. These ways of improving are not mutually exclusive, so competitors should try to compete against each other on both perceived quality and conformance quality.

Superior relative quality is linked to higher relative process, market-share gain, lower relative costs, and higher profitability, as shown in Figure 10 (Buzzell and Gale, 1987, p.81). Total quality is considered essential to ensure competitiveness in global markets and is important to market leaders i.e. organisations with greater market share (Deming, 1982, p.1; Ross, 1994, p.1; Buzzell and Gale, 1987, p.81; Feigenbaum, 1983, p.824; Porter and Tanner, 1996, p.1). Buzzell and Gale (1987, p.81) maintain that market leaders not only command higher processes, but also maintain their leadership position by offering products and services that are superior relative to those offered by competitors. Gaining more market share implies volume growth, rising capacity utilisation, and ultimately, capacity expansion allowing the introduction of new equipment that embodies the latest cost-saving technology. In this way, quality affects many areas of an organisation. The implementation of quality has an exponential effect on financial performance because as time goes on, more functions in a business are positively affected by it (Buzzel, 1987, p.81).

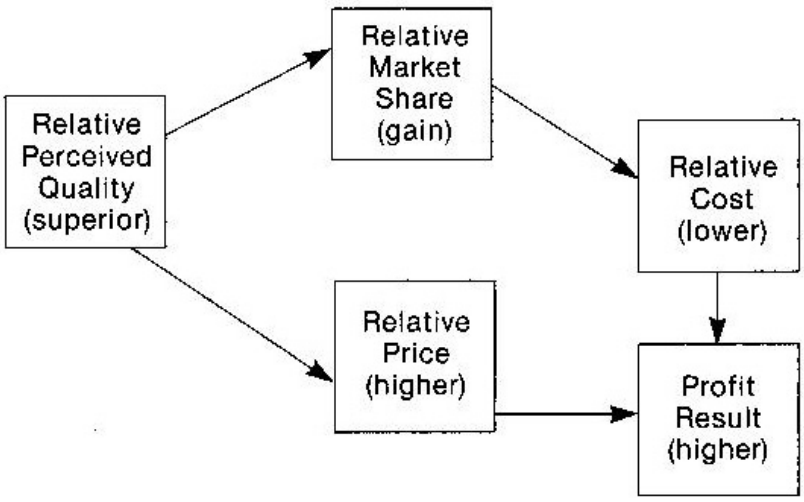

Figure 10: Winning with Superior Perceived Quality

The association between quality, profitability, and market share has been studied in depth by the Strategic Planning Institute (Cambridge, Massachusetts), by the formulation of an extensive database started in 1972. The Profit Impact of Market Strategy (PIMS) database relates business strategies to performance by studying past experiences (Buzzell and Gale, 1987, p.1). The conclusion, based on performance

data of about 3000 strategic business units is (Buzzell and Gale, 1987, p.103; Ross, 1994, p.9):

> "One factor above all others – quality – drives market share. And when superior quality and large markets share are both present, profitability is virtually guaranteed. There is no doubt that relative perceived quality and profitability are strongly related. Whether the profit measure is return on sales or return on investment, businesses with a superior product/service offering clearly outperform those with inferior quality".

The PIMS database demonstrates that relative market share and relative quality exert a strong positive influence on a business's profitability (Buzzell and Gale, 1987, p.73). According to Buzzell and Gale (1987, p.108), organisations that have both larger share and better quality than their leading competitors earn return on investments (ROIs) that are dramatically higher than those of businesses with small share and inferior quality, as demonstrated in Figure 11.

From the above discussion it can be understood how quality improves market share and how market share plays a part in improving financial performance. The positive link with quality should provide an added incentive to implement TQM. PIMS shows that the relative perceived quality of an organisation and its product/service affects its market share. TQM is one initiative that can be implemented to provide that superior relative perceived quality. TQM is a continuous system that monitors and tracks customer's needs as a prerequisite. It can alter systems or its product/service to those needs making sure that the organisation has the superior quality edge in the marketplace.

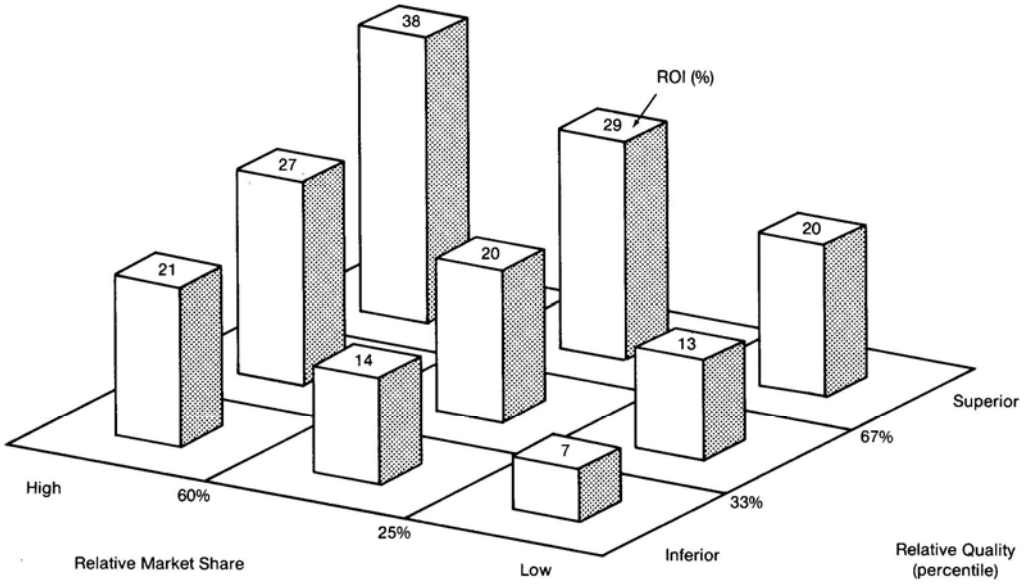

Figure 11: Both Quality and Market Share Drive Profitability

5.2.1. Service Quality and Financial Performance

Many aspects of IT organisations can be classified in the service industry (section 3.2). Considering this, the aspect of how service quality may affect financial performance is discussed.

Berry et al (1989, p. 6) believe that the quality of service provided by an organisation directly affects its bottom line, the effect is positive if the service is good and negative if service is poor, but the association between quality and financial performance is inescapable. He believes that quality service can help cut costs and boost revenues through relationship broadening, productivity enhancement, and error reduction, all characteristics of TQM.

Financial institutions have three ways to increase market share: attracting new customers, doing more business with existing customers, and reducing customer loss (Berry et al, 1989, p. 9). Berry et al (1989, p.9) believe that a reputation in quality service promotes an institution's effectiveness in all three areas. With the implementation of TQM (its main focus being customer satisfaction), it helps the

three factors to increase an organisation's effectiveness. When service quality is increased using proper implementation of TQM, customer satisfaction should also increase. This in turn improves brand loyalty and formation of true customers, increasing profitability.

5.2.2. Customer Retention and Profitability

Ross (1994, p.216) states that a measure for customer satisfaction and profitability is hard to calculate. This may be due, in part, to the difficulty of measuring satisfaction and relating it to profit. An easier, yet theoretically similar, method would be to analyse customer retention and profitability. It is assumed that a retained customer is ultimately satisfied. Ross believes that one way to put a value on customer retention is to assign or estimate a "lifetime retention value", the additional sales that would result if the customer were retained. Taco Bell (food franchise in the US), automobile dealers, and MBNA America (credit card organisation) all found that the value of customer retention is worth striving towards (Ross, 1994, p.216). The system for improving customer retention and profit is illustrated in Figure 12. The motivation is employee satisfaction and the system components are (Ross, 1994, pp.216-217):

- internal service quality to establish and reinforce an organisational quality culture;
- employee retention for good human resource management;
- external service quality delivered through the organisation's quality infrastructure; and
- customer satisfaction to reduce customer defections.

These components link to the principles of TQM implying that if implemented correctly, customer defection is less likely to occur. This indicates an association between customer retention and profit, and hence TQM and profit (Ross, 1994, p.217).

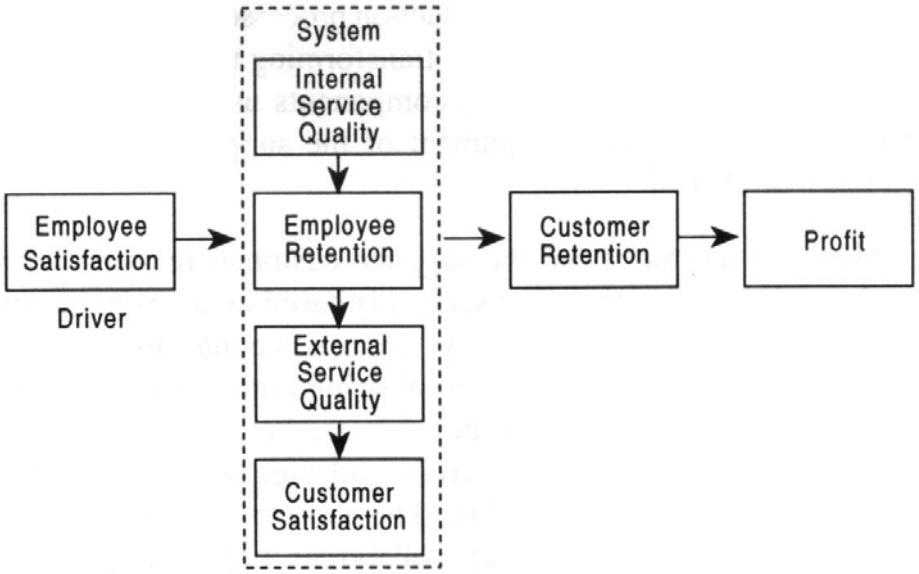

Figure 12: Profitability and Customer Retention (Source: Ross, 1994)

5.3. Quality and Productivity

The association between quality, market share, and profitability was discussed earlier showing that higher quality might lead to both increased profits and greater market share. This section examines the association between quality and productivity. This is because an organisation's financial performance is associated to its quality and productivity improvement approaches (Lee, 2001).

Improvement of productivity (output-per-man-hour) means increasing the ratio of the output of goods and services produced divided by the input used to produce them (Ross, 1994, p.309). This implies that increasing output, reducing the input, or both, can increase productivity. Figure 13 shows some techniques for improving the productivity ratio. Five major ways to improve productivity are as follows (Ross, 1994, pp.310-312):

- Cost Reduction – traditional and most widely used method. This forced cutting of expenses leads to more inefficient processes just to save some money and is not the recommended route.

- Managing Growth – this is a more positive approach and termed cost avoidance. An investment is made for growth, but the investment must return more than the cost, in so, increasing the productivity ratio.
- Working Smarter – this means more output from the same input. This can be obtained by reducing manufacturing cost through product design, improving processes, or getting more production from the same level of raw materials by increasing inventory turnover.
- Paring Down – similar to cost reduction, except that as sales or production is off, input should be reduced by a proportionately larger amount, thus increasing the ratio. This could imply getting rid of the no longer productive, the obsolescent, and the obsolete.
- Working Effectively – this is the best method and believes more is attainable for less. This is the TQM approach by creating a quality culture, involving employees, improved communications, employee training etc.

A misconception exists that if time and money is devoted to quality, attention is removed from productivity and hence reduces output. While this may be the case in the short term for some, it generally is not true over a longer period of time (Ross, 1994, p.300; Buzzell and Gale, 1987, p.7; Deming, 1982, p.1).

Deming (1982, pp.1-2), who based it on the reduced productivity that is caused by quality defects, rework and scrap, made the argument for a positive relationship. He concluded: “improvement of quality transfers waste of man-hours and of machine-time into the manufacture of good products and better service”. Feigenbaum (1977, p.21) maintains that a certain “hidden” plant exists to re-work and repair defects and returns, and if quality were improved, this hidden plant would be available for increased productivity. When the broader picture is considered it can be shown that increasing quality also increases productivity, and the two are mutually reinforcing (Harrington, 1991, p.26; Ross, 1994, p.300, Buzzell and Gale, 1987, p.6). TQM is then associated with cost reduction, greater efficiency, better use of resources, and organisational restructuring i.e. increasing productivity (Feigenbaum, 1983, p.824). With this positive link between quality and productivity and hence market share and

profitability, productivity can also improve with the implementation of TQM, and hence affect financial performance.

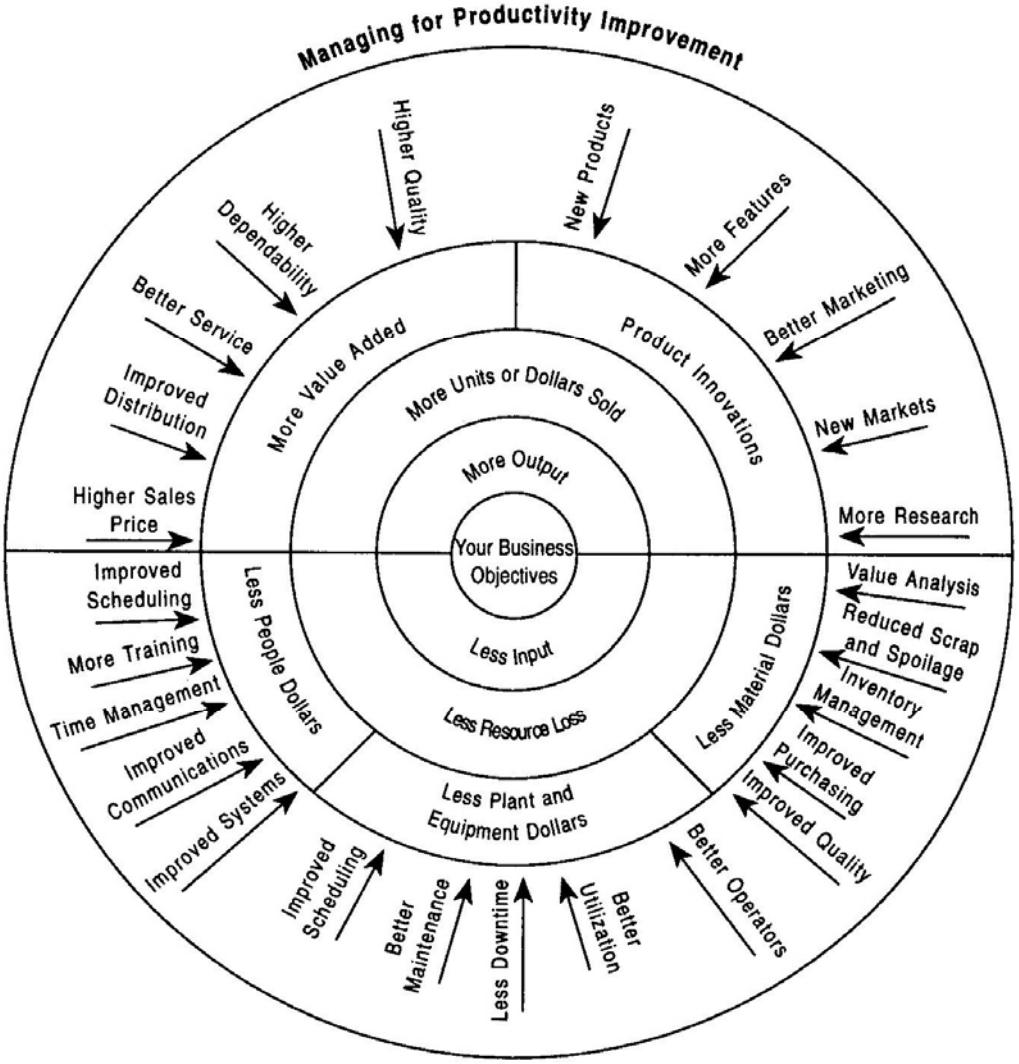

Figure 13: Productivity Wheel

Harrington (1991) and Buzzell and Gale (1987) believe that organisations pursuing quality as a competitive strategy have found that improved quality, increased productivity, reduced costs, and enhanced customer satisfaction go hand in hand. This was confirmed by a study by McAdam and McKeown (1999). They found that although TQM businesses said that it had been worthwhile implementing TQM, no businesses specified the effects of TQM on bottom line performance results or, more importantly, the actual positive impact on customer satisfaction. In spite of increased customer satisfaction, experienced by 55% of the survey, it appears that many of these

businesses are chasing after internal benefits rather than focusing on customers (McAdam, 1999, pp.229-242). They found that the main reason and benefit for implementing TQM was tending towards internal matters such as reducing costs and increasing productivity, 73% and 55% of businesses respectively. Although this may be incorrect, in the sense of implementing TQM for improved customer satisfaction, it does highlight that TQM does affect certain internal benefits (reducing costs and increased productivity).

5.4. Quality and Stock Price Performance

A study by the United States Commerce Department's National Institute of Standards and Technology (NIST) was done on whether TQM affects investment performance in Malcolm Baldrige winners and applicants. NIST invested a hypothetical $1000 in each of the five publicly traded whole organisation winners of the Baldrige Award and the parent organisations of seven subsidiaries. The progress of the investment was tracked from the first business day in April, the year they won the award, or the date they went public- till 3 October 1994. Adjustments were made for stock splits and/or dividends. Another hypothetical $1000 was invested in the Standard & Poor's (S&P) 500 at the same time. Overall, the Baldrige portfolio achieved a 92% return on investment (ROI) compared with a 33% ROI for the S&P 500 (NIST, 1995).

In addition, NIST invested a hypothetical $1000 in the publicly quoted Baldrige applicants during 1990 through to 1993. The applicants outperformed the S&P 500 portfolio by a ratio of 4.5 to 1. These studies add to the empirical evidence that TQM can lead to superior financial performance (Porter and Tanner, 1996, p.253). Baldrige Award winners provide examples that investment in quality programmes may result in cost savings, market share improvement, and impressive improvements in manufacturing and service performance (NIST, 1995). Robinson (Iversen, 2002, p.6) states "once you're using advanced management techniques, including things like Six Sigma, ISO, and Malcolm Baldrige, you start to gain efficiencies that your competitors do not have". Those efficiencies may pay off in improved profitability and other benefits that the stock market rewards. This study highlights the importance of share price movement by incorporating it as one of the six financial indicators.

5.5. Research Findings

Agus (2000) performed a study on Malaysian organisations that empirically investigates the simultaneous linkages between TQM, customer satisfaction, and financial performance relative to competitors. The paper offers empirical evidence of the contributing attribute of TQM practices on customer satisfaction and, ultimately, financial performance in comparison with competitors. The results suggest that the implementations of TQM may lead to the enhancement of customer satisfaction and ultimately improve the financial performance of manufacturing organisations in Malaysia.

Eriksson (2003) in Sweden and Singhal and Hendricks (1997, 1999, 2001) in United States performed two different, yet similar in method, studies to determine the impact of TQM on financial performance. Both examine quality award winners and compare them to a competitor of similar size, scope, and industry not implementing TQM (matched control groups). Results examine a five-year implementation period and a five-year post implementation period. The results of both studies show significant associations - during the implementation period the award recipients did not necessarily perform better than their competitors, but during the post implementation period award winners significantly outperformed organisations in the various control groups. Eriksson (2003) found that the award recipients show a significantly higher return on assets than their competitors and the branch indices during the post implementation period of TQM. Also, the indicators, change in sales, change in number of employees and return on sales, show that the award recipients outperformed the branch indices during the post implementation period (Eriksson, 2003, pp.36-51). Singhal and Hendricks (2001) quantified gains by stating, “depending on the control group used, the mean out performance ranges from 38% to 46%”. Moreover, these organisations had a 48 percent higher growth rate in operating income and 37 percent higher growth in sales. They also outperformed their control counterparts in operating margins and growth in assets. The studies show that effective implementation of TQM principles and philosophies lead to significant wealth creation. This theory guides towards one of the objectives of this research (to establish if there is any direct link between TQM and financial performance).

5.6. Conclusion

Various authors indicate that the rewards of higher quality are positive, substantial, and pervasive. Findings indicate that attaining quality superiority produces the following organisational benefits:

- Stronger Customer Loyalty – quality creates true customers, customers who will use the organisation again and praise it to others (Zeithaml, 1990, p. 9; Berry et al, 1989, pp. 6 - 9).
- Market Share Improvements – key to an organisation's growth and profitability (Buzzell and Gale, 1987, p.103).
- Higher Stock Prices – Robinson (Iversen, 2002) developed the Q100 - an index of organisations selected for their leading quality management methods. Since the inception of the index in September 1998 through the end of 2001, Q100 organisations returned 26.97%, compared to 17.59% for the Standard & Poor's 500 stock index during the same period.
- Higher Prices – superior perceived quality implies an organisation can charge a higher price for the superior quality and let the premium fall right to the bottom line or better customer value can be offered by charging same price as competitors but for superior product/service offering (Buzzell and Gale, 1987, p.105).
- Increased Efficiencies and Greater Productivity – quality costs money to implement (technology, training, research, systems) but with increased quality comes increased revenues due to increased sales volume and higher premium prices. Service errors are also decreased saving money. This creates a balance that in the long term increases an organisation's efficiency and productivity (Zeithaml, 1990, p. 11, Ross, 1994, p.300, Buzzell and Gale, 1987, p.6).
- Lower Cost Quality – superior conformance quality means lower cost of quality than that of competitors, and thereby a lower overall cost (Buzzell and Gale, 1987, p.107).

The positive link between market share, profitability, productivity, stock price performance and the implementation of TQM was discussed above. Quality is a winning business strategy (Berry et al, 1989, p. 4; Porter and Tanner, 1996, p.268).

Organisations that adopt sound TQM principles deliver better performance for their stakeholders. Customers, employees, shareholders and society at large benefit. Furthermore, these organisations may have a better understanding of the major factors that impact on their performance.

The PIMS database reveals that high relative market share combined with high relative quality exerts a strong positive influence on the profitability of a business, affecting its financial performance. The PIMS database not only establishes the association between market share and profitability, but market share and quality.

Views on the negative impact of implementing quality practices also exist. Some reasons behind this can be found in Appendix O. In summary, negative publicity about TQM has caused organisations to question the association between TQM and financial performance. This is mainly due to unrealistic expectations, quick-fix mentality, and competition from other tools. TQM is a long-term challenge that, if implemented correctly, may improve financial performance as discussed in this chapter.

Kathleen (1995, p.18) believes that TQM is a comprehensive and integrated way of managing any organisation to meet the needs of the customer consistently. Customer satisfaction and organisation profitability are linked together. If customers are not satisfied, they are lost, this having an adverse effect on profit. Quality cannot be seen as separate from overall performance or the bottom line. It should be woven throughout an organisation's business practices.

This evidence indicates a positive association between TQM and financial performance. Eriksson (2003), Singhal and Hendricks (1997, 1999, 2001), and Agus (2000) managed to find a significant association between the implementation of TQM and improved financial performance using similar financial indicators. This is the association that is attempted to be established in this research.

It was shown that TQM may be defined by the level of implementation in each of its eight principles (Chapter Three). These are:

1. top management involvement;
2. information systems;
3. strategic quality planning;
4. human resource development;
5. management of quality;
6. customer focus and satisfaction;
7. management structure and teams; and
8. cost of quality.

It was further shown that the financial performance of organisations may be measured by using six financial indicators (Chapter Four). These are:

1. percentage change in sales;
2. percentage change in return on sales;
3. total asset turnover;
4. return on assets (ROA);
5. return on equity (ROE); and
6. percentage change in share price.

It was also shown how quality may have an effect on financial performance of organisations by affecting factors such as market share, productivity, customer loyalty, and share price movement (Chapter Five). These are not attempted to be measured directly (except for changes in share price) as these should follow quality implementation and hence improve financial performance, which is measured using the six financial indicators.

This research attempts to establish if there is any association between TQM and the financial performance of organisations, as previous studies' findings have shown. Theses findings lead to the formation of the null hypothesis - there is no association between the number of TQM principles implemented (level of implementation of eight principles) and financial performance of organisations (measured by the six financial indicators). This research focuses on selected listed organisations on the Information Technology sector of the JSE.

PART THREE: THE RESEARCH PROCESS

Chapter Six: Research Methodology

6.1. Introduction

This chapter outlines the boundaries of the research as well as giving a comprehensive account of the research methodology used. The chapter includes a description of the statistical methods used at various stages in the study.

Chapters two and three provide a detailed description of TQM. The task is to use this information to determine how much of it has been implemented in the selected organisations.

This chapter concludes with methods used to calculate the TQM and financial performance scores. Questionnaires and interviews have been used to collect data, the analysis of which is described in chapters seven, eight, and nine.

6.2. Research Question

The overall objective of this research is to evaluate the association between TQM and financial performance in selected IT sector businesses listed on the JSE.

This report provides results for the objectives and a hypothesis. The following objectives are set out for the study:

1. to determine the extent of TQM principles application in the organisations;
2. to examine financial performance of the organisations;
3. to establish if there is any direct link between TQM and financial performance in each organisation; and
4. to discuss evolution of TQM in the IT industry.

The first research objective about TQM application is answered by analysing the TQM questionnaire results. Financial performance (the second study objective) is

tested by calculating and assessing the six financial indicators. The third research objective, an association between TQM and financial performance, is established by comparing TQM scores against the financial performance scores using multiple linear regression. Evidence for discussing the evolution of TQM (fourth objective) is obtained from interviews with the organisations' representatives and a literature survey.

The null hypothesis from objective three is formed:
There is no association between the level of TQM implementation and financial performance of organisations of the information technology sector listed on the JSE.

The reason for this inclusion is the different method of testing and handling of objectives and the hypothesis. Objectives provide a qualitative description of the results whereas a hypothesis is used where the data is tested by statistics.

6.3. Research Design

Malhotra (1999, p.83) defines a research design as a framework or blueprint for conducting the research project. It details the procedures necessary for obtaining the information needed to structure or solve the research problem. Research designs may be broadly classified as exploratory, descriptive, or causal in nature (Malhotra, 1999, p.83). Exploratory research is the initial step in the overall research design framework that provides insights and understanding of TQM and its possibilities in terms of affecting financial performance. This information is obtained from an in-depth literature survey and leads to tentative findings. It is then followed by descriptive research, which concerns this study. A clear statement of the problem, testing a specific hypothesis and examining specific relationships marks conclusive descriptive research (information is clearly defined and the research process is formal and structured). It has its major objective as the description of something – usually market characteristics or functions (Malhotra, 1993, p.95). Because the descriptive research is also used to identify the factors that influence financial performance and put together the indicators to use for each organisation, the association between the TQM results and financial indicator results are analysed.

Causal research is not used because it involves a relatively controlled environment and uses experimentation as the main method of research with the objective of obtaining evidence regarding cause-and-effect relationships (Malhotra, 1993, p.102).

To provide the most accurate results for objective four (contemporary view of TQM), a case study approach is taken. A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used (Yin, 1984, p.23). Yin states that the case study is able to add two sources of evidence – direct observation and systematic interviewing, and allows an investigation to retain the holistic and meaningful characteristics of real-life events such as managerial processes like TQM (Yin, 1984, p.14). These facts are reflected in this study where TQM is examined (a contemporary event), interviews held with the IT organisations investigated and the relevant behaviours are not able to be manipulated.

A multiple cross-sectional case design is implemented where multiple samples are taken from a single organisation.

6.4. Sampling Design Process

It is not possible to investigate all organisations or every employee in the relevant sector. A sample of the target population is taken. Leedy (1985, p.144) said “the results of a survey are no trustworthier than the quality of the population or the representatives of the sample”. He states that population parameter and sampling procedures are of paramount importance and become critical factors in the success of the study.

The major stages involved in a statistical sampling study can be seen in Figure 14. The planning stage, data collection instruments, and procedures are discussed in this chapter while chapters seven through to nine cover data analysis and conclusions.

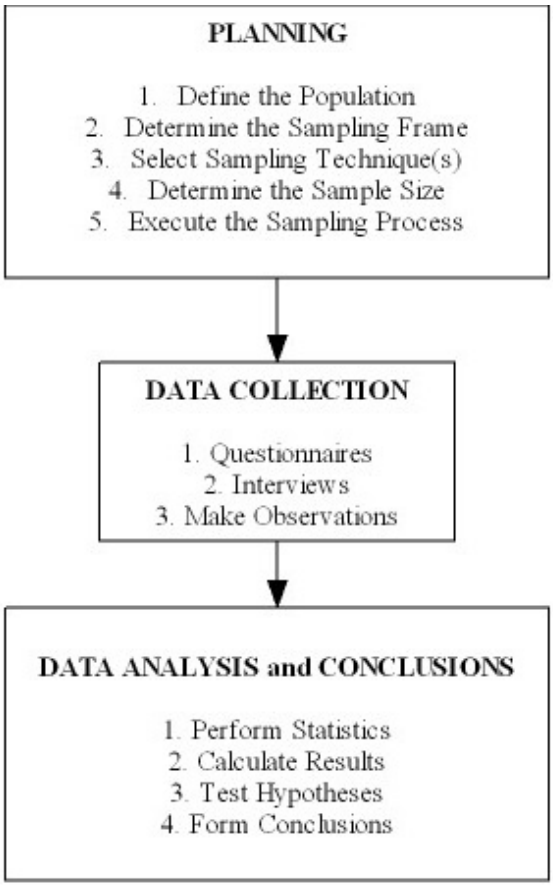

Figure 14: Major Stages in a Statistical Sampling Study

Malhotra (1993, p.353) identifies five steps in the sampling design process:

1. Define the Population.
2. Determine the Sampling Frame.
3. Select Sampling Technique(s).
4. Determine the Sample Size.
5. Execute the Sampling Process.

6.4.1. Define the Target Population

Malhotra (1993, p.352) defines target population as “a collection of elements or objects that possess the information sought by the researcher and about which inferences are to be made”. One industry is chosen to eliminate variations between industries. The information technology sector of the JSE, as discussed in Appendix A,

is chosen for this study and judgements and results are limited to this sector. It may be defined in terms of its:

- elements – representatives and respondents;
- sampling units – IT organisations taking part in the survey;
- extent – Gauteng Province (head office or branch); and
- time – August to November 2005.

A TQM culture that creates an organisational infrastructure consistent with continuous quality improvement needs to be instilled into the personalities of all employees. It is for this reason that the survey is not limited to management, but non-managerial personnel are solicited for their involvement, too.

The research is, however, limited to the head office or branches in Gauteng. This is due to time and cost constraints because the researcher only has access to locations within the immediate area. The organisations were approached and data collected within four months of the year 2005. Interviews were held and questionnaires handed out in August and September. In October and November organisations were repeatedly contacted by phone and e-mail until sufficient data from each organisation was collected.

6.4.2. Determining the Sample Frame

Malhotra (1993, p.353) defines the sampling frame as a representation of the elements of the target population that consist of a list or set of directions for identifying the target population. The frame is important in statistical studies because it helps to define the population (Lapin, 1982, p.9). There are six main reasons and considerations why a sample must be taken (Lapin, 1982, pp.72-74): economy, timeliness, the large size of the population, inaccessibility of some of the population, destructiveness of the observation, and accuracy.

There were 24 listed organisations in the IT sector at the time during the research process. Certain criteria were set to allow their inclusion in the study. These criteria were that they are:

1. listed on the JSE in the Information technology sector;
2. listed for a minimum of six years i.e. the audited financial records to be available since the year 2000;
3. located in Gauteng to allows access for interviews and site visits;
4. having a number of employees exceeding 50 in the Gauteng branch so that there would be more of an incentive to implement TQM initiatives; and
5. allowing permission for site visits and an interview to study the management philosophy first hand and examine exactly methods of quality principles application.

Out of 17 possible organisations in the IT sector, within the boundaries (points 1-4 above), 10 respondents met all the criteria set (including point 5 above) and were investigated. This response rate indicates that approximately 60% of all the possible approachable organisations and 40% of all organisations in the IT sector turned out to be subjects of the study.

Due to the highly heterogeneous set of companies investigated (differing in IT services and employee numbers), a frame size cannot be adequately established, therefore, a sample frame is difficult to determine. The maximum number of IT organisations that fit the boundaries (points 1-4 above) stated were attempted to be contacted. The combination of sampling methods (convenience method for organisations and probability method for individual respondents) provides the sample for this research.

6.4.3. Select a Sampling Technique

A sampling technique involves decisions of a broader nature (Malhotra, 1999, p.331). Sampling used is traditional sampling without replacement. This implies that an organisation or any employee approached cannot be included in the sample more than once.

With regards to the sampling technique, probability or nonprobability sampling has to be decided upon next. Malhotra (1993, p.368) states that the choice between

nonprobability and probability samples should be based on considerations such as the nature of the research, degree of error tolerance, relative magnitude of non-sampling versus sampling errors, variability in the population, as well as statistical and operational considerations. Nonprobability sampling relies on the personal judgement of the researcher rather than chance to select sample elements. In probability sampling, sampling units are selected by chance i.e. chosen through some random process. This is also the most accurate form of sampling and this permits the researcher to make inferences or projections about the target population from which the sample was drawn (Malhotra, 1993, pp.357-358).

The potential organisations had certain criteria attached (10 organisations remained) and one representative was interviewed from each organisation. This is an example of convenience sampling, which is a type of nonprobability sampling technique. Malhotra (1993, p.358) defines convenience sampling as a technique that attempts to obtain a sample of convenient elements. The selection of sampling units is left primarily to the interviewer. Convenience sampling is the least expensive and least time consuming of all sampling techniques. The sampling units are accessible, easy to measure, and cooperative.

Malhotra (1993, p.358) goes on to describe the limitations of convenience sampling. The main one being that there are many potential sources of selection bias. To eliminate the problem in this research, the researcher did not choose any random representative, but rather opted for the best-qualified representative from each organisation. With regard to the respondents, the representative was asked to distribute the questionnaires randomly between four divisions to eleven respondents. In this way the researcher played no part in their selection. This implies probability sampling. Due to these steps it is felt that the study's validity is not compromised by the researcher, however, the representatives may have compromised the validity.

6.4.4. Determine the Sample Size

Malhotra (1993, p.354) defines sample size as the number of elements or units to be included in the study. It is important to choose the survey sample that best reflects the

overall population of the organisation. In general, for more important decisions, more information is necessary and the information should be obtained more precisely. This requires larger samples, but as the sample size increases, each unit of information is obtained at a greater cost (Malhotra, 1993, p. 354). Working within these constraints, a considerable fraction of the population is obtained - 40 percent of the organisations listed in the IT sector on the JSE. This exceeded sample sizes used in the past studies on TQM researched – 24% for Agus (2000) and 20% for Singhal and Hendricks (2001).

To initiate contact, an interview was held with an organisation representative. The researcher attempted to interview the highest-ranking manager dealing with quality aspects or, if there were no relevant managerial structures in place, a manager who had the greatest knowledge of quality practices within the organisation. Discussion included the management philosophy of the organisation as well as general South African trends in the field, with special attention made to the organisations' quality principles either already in place or outlined for the future. No attempt was made to interview or discuss any quality principles with any personnel other than the representative. Reasons included better management accessibility to the researcher, and the possibility to positively influence others to take part in the survey. Time and financial constraints also limited interviews to only one representative per organisation.

Sets of questionnaires were left with the representative to be handed out to other employees. The representatives were asked to distribute a minimum of 12 questionnaires (including one for the representative) throughout the organisation between a minimum of four divisions, e.g. marketing, human resources, quality, finance, IT, etc. The representatives were asked to exclude certain divisions of an auxiliary character such as cleaning services, reception, etc. Then completed questionnaires were collected internally and given back to the researcher. The representatives were told that a minimum of 10 questionnaires were required. The number of questionnaires collected can be seen in Table 3. Out of a required 100, 96 questionnaires were completed indicating an 80% response rate and a 96% return on the required amount. Being short of a 100% was mainly due to the lack of participation of Company J as only the representative completed a questionnaire. The

high response rate may have been attributed to the favourable ratio between the real (a large number of employees) and potential respondents (twelve) and a favourable attitude of the organisations towards the research (one of the stated boundaries of the study).

There is space on the questionnaire where the respondent was asked to complete their position and department in the organisation. This is only used to check if different employees in different departments were being asked to participate. No conclusions are drawn from this.

Table 3: Breakdown of Completed Questionnaires by Company

Company	Questionnaires
A	6
B	12
C	12
D	12
E	12
F	9
G	10
H	11
I	11
J	1
Total:	96

6.4.5. Execute the Sampling Process

Once it is made clear the exact specification of the sampling process with respect to the population, sampling frame, sampling unit, sampling technique, and sample size, the sampling process can be executed. Procedures that needed to be in place for unexpected results included:

- organisation inaccessible – approach next organisation in list until maximum number of organisations out of a possible 24 participate;
- representative inaccessible – investigate next possible representative until a suitable replacement is found;
- sample of organisations from IT organisations not forming a sufficient sample -approach other sectors closest to IT sector, e.g. engineering (but with some

consequences in results and validity). This did not have to be reverted to in this study; and

- not enough questionnaires were returned from the organisation – organisations were given 12 questionnaires when only 10 were required. If five or less were not returned the organisation could make no significant impact on the findings. The results would be documented, but no conclusion could be drawn from that particular data.

Non-response errors arise when some of the potential respondents included in the study do not respond (Malhotra, 1993, p.369). Methods to attempt reducing the number of non-respondents included:

- prior notification given in the form of arranging a meeting time after discussing the study upfront on the phone;
- respondents motivated and given incentives in the form of obtaining the results to the study. This could aid the organisation in determining what principles were implemented and which were lacking, how the organisation's practices compared to other IT organisations as well as learning future trends in quality management philosophies. Further motivation to respond was enhanced by the promise of confidentiality;
- clear, precise questionnaire design and administration; and
- follow-ups after the initial contact either via e-mail or phone.

6.4.6. Conclusion

The sampling design process places the research in context imposing boundaries for the study, these are summarised as:

- The Industry - the information technology sector of the JSE.
- The Organisations – ten organisations meet the requirements set. To meet the anonymity nature of this research, they are labelled organisations A to J.
- The Respondents – survey is not limited to management as questionnaires were left with representatives to be handed out to other employees and

completed at their own time. Contact was attempted with the highest-ranking manager dealing with quality issues of the organisation.

6.5. Data Collection

Once the type of research design has been determined, initiated, and the information to be obtained specified, measurement and scaling techniques need to be decided on. This critical part of any research process must be as precise as possible to increase the accuracy and validity of the results (Malhotra, 1994, pp.275-277). The purpose of this section describes how the data required is collected i.e. takes the defined TQM information, formulates questions and obtains answers to be analysed.

Structured data collection is performed in this survey. Formal questionnaires are prepared and the questions are asked in a pre-arranged order. An attached formal letter given to the respondents outlines the purpose of the questionnaire. All paperwork used in the approaching of the organisations can be seen in Appendix P.

Interviews were also held before the questionnaires were handed out, but questions were not strictly pre-structured that is, information about organisations' TQM was gathered from different angles in an open dialogue to adjust to the various styles of the organisations' representatives. The information obtained from this is qualitative in nature. The overall aim was to:

- obtain a background of the organisation and any past and future developments with regards to management style;
- obtain a background of the way quality is understood within the organisation;
- obtain an understanding of developments in SA and any past and future trends the organisation feels worth mentioning with regards to different quality management philosophies;
- obtain information on any type of quality management system the organisation is looking into or has in place; and
- experience any quality principles in place.

6.5.1. Survey Instrument – Questionnaire

The questionnaire is based on the guidelines used to evaluate applicants for the Malcolm Baldrige National Quality Award (MBNQA) in the year 1996. Each principle is then examined using an in-depth literature review to provide further understanding resulting in some exclusion (business performance) and inclusions (cost of quality, management structure and teams). In addition to this, much attention is given to the type and structure of questions used previously in the case studies of Ross (1994) to evaluate organisations. The format and content of the questionnaire is therefore developed from the MBNQA principles, each principle's understanding (through a literature review), and certain case study questions used in Ross (1994). The questionnaire can be found in Appendix Q.

The six factors (principles) of the MBNQA discussed in chapter three are used as the different sections in the questionnaire. The weightings of each section are largely obtained from analysing the weightings of the MBNQA between the years 1989 and 2006. The reason for analysing so many years is due to yearly weightings' changing. More weighting is being put onto business and operational results as the award progresses each year. This covers areas not investigated in this research such as product and service outcomes, financial and market results, and social responsibility results i.e. more external influences of the organisation (e.g. in 1994, 18% of the total mark reflected operational results whereas in 2005, it was 45%). This trend follows the evolution of management theory due to the result of changes in the environment (Smit, p. 57, 1999). This includes social development, sustainability, corporate governance, and environmental concern issues in South Africa. These are not measured or focused on with regards to TQM, as it is in the MBNQA; hence the final weightings are based on appropriate measures of TQM. For an example of MBNQA weightings, refer to Appendix E.

The final weightings used are in Table 4. The cumulative mark from each section forms a total of 100 for each organisation. Obtaining top weightings of 20% highlights the importance of top management and customer focus and satisfaction.

This is followed by the need for human resource development and management of process quality.

Table 4: Section Weightings

Section	Description	Weighting
A	Top Management Involvement	20
B	Information Systems	10
C	Strategic Quality Planning	10
D	Human Resource Development	15
E	Management of Process Quality	15
F	Customer Focus and Satisfaction	20
G	Management Structure and Teams	7.5
H	Cost of Quality	2.5
Total:		100

Sections G and H are not covered as separate entities in the Malcolm Baldrige criteria, but are included as separate sections, in this research, after analysing the evaluation techniques used by Ross (1994). The TQM process needs an appropriate organisational infrastructure, therefore it is analysed for each organisation. The cost of quality is an indication of how much is spent on non-conformance. It can be used as a benchmark for progress. It provides basic understanding of why implementing TQM may prove profitable. Since sections G and H are not included in the Malcolm Baldrige award, they constitute only 10% together from the overall TQM score.

Questions under each section link to a single principle of TQM. All the sections can then be analysed in turn to provide an overall score for TQM at different organisations.

The questionnaires were given to a representative of the organisation and then distributed by them to other managerial and non-managerial personnel as discussed in section 6.4.4.

6.5.1.1. Measurement Techniques

Malhotra (1993, p.277) and Leedy (1985, p.173) define measurement as a means of assigning numbers or other symbols to characteristics of objects according to certain pre-specified rules. Measurement of data is expressed by means of various scales. The questionnaires measure employees' perceptions, attitudes, or preferences about the principles of TQM. The principles then describe TQM as a whole for each organisation. Each principle and its associative questions are assigned weightings and values. These values then indicate the level of TQM implementation at each organisation.

The two different types of measuring techniques utilised in this research are:

1. dichotomous questions – requiring a simple "Yes", "No", or "Don't Know" response (Malhotra, 1993, p.328); and
2. five-point Likert-type itemised scales – requiring the respondents to indicate their opinions on a rating scale.

There are four primary scales of measurement - nominal, ordinal, interval, and ratio (Malhotra, 1993, p.277; Leedy, 1985, p.173). The type of scaling technique employed in the study is a Likert itemised rating non-comparative interval scale. This uses a method whereby numbers are used to rank objects such that numerically equal distances on the scale represent equal distances in the characteristics being measured (Malhotra, 1993, p. 280).

6.5.1.2. Dichotomous Questions

A dichotomous question has only two response alternatives supplemented by a neutral alternative. The neutral option is given because different knowledge about quality practices, or no involvement in any quality practices leading to uncertainty about what the questions might be referring to, was expected.

6.5.1.3. Itemised Rating Scales

This is the type of non-comparative scaling technique used to construct various rating scales. The respondents are provided with a scale that has a number or brief description associated with each category (Malhotra, 1999, p.270). This includes an agreement scale, percentages, and timing in the questionnaire. The most widely used type of scale is Likert. Respondents indicate their degree of agreement or disagreement with each of a series of statements about the stimulus object. A five-point scale is used; strongly disagree to strongly agree. To conduct the analysis on all multi-item scales, each statement is assigned a numerical score, ranging from -2 (strongly disagree) to +2 (strongly agree). The six major concepts involved when constructing itemised rating scales and their decisions are:

1. the number of scale categories to use – five;
2. balanced versus unbalanced scale – balanced (objective data);
3. odd or even number of categories – odd;
4. forced versus unforced choice – unforced;
5. the nature and degree of the verbal description – Verbal and numerical scales used (numerical include percentages and time horizons); and
6. the physical form of the scale – horizontal boxes.

Respondents readily understand how to use the scale, making it suitable to be completed independently (Malhotra, 1999, p.272).

6.5.2. Pilot Study

A pilot study was performed to refine the techniques used to approach the selected organisations and test the questionnaire. The pilot study participants were from NetStar, which is part of the umbrella group, Altech, listed in the Electronic and Electrical Equipment sub sector of the General Industrials sector on the JSE. They deal with the research and development of vehicle tracking devices. NetStar was chosen because, although not located in the Information technology sector, it is in a similar field dealing with the development of new technology, marketing the technology to the customer, and providing customer service.

The preliminary questionnaires were handed out to the CEO, management, and sub-management (15 in total). Once completed, they were discussed with the CEO of NetStar who is knowledgeable in TQM. Attention was paid to determining its best layout, question content, wording, sequence, appropriate length, and the importance of certain TQM principles. Once questionnaires were corrected, the post-correction questionnaire was dispensed again, this time only to the CEO, one manager, and one non-managerial employee resulting in no further corrections. They also felt that the final altered questionnaire was effective in procuring the required information.

The time it took various respondents to fill in the questionnaire was between 10 and 15 minutes and both management and normal employees understood all the questions. This confirmed that it was not necessary to form two separate questionnaires, as was designed in planning.

Respondents of the pilot questionnaire suggested that TQM should also include the characteristics of potential employees. Character and personality tests should be done at the interview to determine if the personality of the candidate fits the quality culture in the organisation. No job seekers should be hired if strong quality values are not evident. This aids the overall quality movement process as employees already have the correct mindset or personality traits, and an understanding of some TQM principles. This makes the continuous transformation towards quality easier. As a result, a question was included in the questionnaire (human resource development and management section in Appendix Q).

The general method of approaching organisations was also discussed - how to establish point of entry and how to conduct the interview respecting their confidentiality at the same time.

6.6. Questionnaire Evaluation

The questionnaire implored the use of itemised scaling questions. A multi-item scale should be evaluated for accuracy and applicability. This involves the assessment of the reliability and validity of the scale (Malhotra, 1999, p.280).

6.6.1. Reliability

A multi-item scale such as the one used for certain questions in the questionnaire needs to be evaluated for reliability. Reliability refers to the extent to which a scale produces consistent results, if measurements are made repeatedly (Malhotra, 1999, p.281). Determining the proportion of systematic variation in a scale assesses reliability. This is done by determining the association between scores obtained from different administrations of the scale. If the association is high, the scale yields consistent results and is therefore reliable (Malhotra, 1999, p.282). Statistical approach used for assessing reliability is the coefficient alpha, or Cronbach's alpha. It represents an estimate of internal consistency of items in a scale (StatsDirect, 2005).

Malhotra (1999, p.282) explains Cronbach's alpha as the average of all possible split-half coefficients resulting from different ways of splitting the scale items. This coefficient varies from 0 to 1, and a value of 0.6 or less generically indicates unsatisfactory internal consistency reliability (Malhotra, 1999, p.282).

6.6.2. Validity

The validity of a measuring instrument may be defined as (Malhotra, 1993, p.309):

> "The extent to which differences in observed scores reflect true differences among objects on the characteristics being measured, rather than systematic or random errors**."**

Garson (2005) indicates that a study is valid if its measures actually measure what they claim to, and if there are no logical errors in drawing conclusions from the data. He states that there are a great many labels for different types of validity, but they relate to threats and biases that would undermine the meaningfulness of research. To increase the confidence of the questionnaire and hence provide stronger conclusions from the study, the questionnaire is assessed as a measuring instrument by its content, criterion, and construct validity.

In addition to these, the issues of internal and external validity warrant thought. When conducting an experiment, the researcher must draw conclusions about the effects of independent variables on the study group (internal validity) and make valid generalisations to a larger population of interest (external validity).

6.6.2.1. Content Validity

This is a subjective evaluation of how well the content represents the measurement task at hand i.e. how well it directly measures TQM. The questionnaire must stand by itself as an adequate measure of TQM (Nunnally, 1978, p.91; Malhotra, 1993, p.309). Content validity results from careful and systematic building of the questionnaire. To ensure that, a few steps are undertaken:

- The sections, structure, and section weightings are derived directly from the internationally used Malcolm Baldrige National Quality Award.
- Actual questions and question structure are derived from case studies used to evaluate each principle of TQM from Ross (1994).
- Each section has a heading indicating to the respondents the topic of the questions to follow.
- Questions are formed in sections; each question and section is formed through an in-depth literature survey.

Content validity is improved on the above issues.

6.6.2.2. Criterion Validity

Criterion validity reflects whether the measurement performs as expected to other variables selected as meaningful criteria. Variables may include demographic and psychographic characteristics, attitudinal and behavioural measures, or scores obtained from other scales (Malhotra, 1993, p.309). Because of the exploratory nature of this research (see section 6.3) and hence the lack of data available on quality practices in the IT industry in South Africa, the criterion validity of the questionnaire cannot be determined.

6.6.2.3. Construct Validity

Construct validity addresses the question of what construct or characteristic the scale is, in fact, measuring. Construct validity is the most sophisticated and difficult type of validity to establish (Malhotra, 1993, pp.309-310). It deals with how the scale correlates positively or negatively with other external constructs. Due to budget and time constraints and lack of external comparisons and tests, construct validity of the questionnaire cannot be established.

6.6.2.4. Internal and External Validity

Garson (2005) explains that internal validity addresses the "true" causes of the outcomes that are observed in the study. It has to do with defending against sources of bias that would affect the resultant process being studied by introducing covert variables i.e. whether the observed effects on the organisations' financial performance could have been caused by variables other than TQM.

Garson (2005) describes external validity as having to deal with possible bias in the process of generalising conclusions from a sample to a population, to other subject populations, and/or to other settings i.e. beyond the investigated organisations into the entire IT sector and conclusion drawn about TQM. Threats to external validity arise

when the conditions of the research do not realistically take into account the interactions of other relevant variables in the real world (Malhotra, 1993, p.225).

Control of extraneous variables is a necessary condition for establishing internal and external validity. Extraneous variables are discussed, and any steps to combat them stated, in Appendix R. In summary, most extraneous variables become a problem when the study is either longitudinal (testing affects, mortality, instrumentation), the passage of time during the study provides external factors that may influence results (maturation, history, instrumentation), or there exists any bias with the respondents (maturation, selection bias). This research was cross-sectional in nature, research on the organisations took four months to complete, organisations had to be willing to take part, and management were asked to distribute the questionnaires internally within the organisation as an apparent directive from higher authority. These factors improve upon and/or eliminate these extraneous variables.

6.7. Statistical Analysis

Leedy (1985, p.147) maintains that unless the sampling is carefully planned and statistically tested, distortion is likely to be present in the conclusions from the data. Statistical analysis that follows the sampling technique and collection of data to validate the information and make inferences about the IT industry are discussed in this section. The survey by means of questionnaires is quantitative in nature. Qualitative data can be obtained from the descriptive analysis of the results and from interviews.

Lapin (1982, p.2) describes statistics as a body of methods and theory that are applied to numerical evidence when making decisions in the face of uncertainty. Statistics are used in two respects:

1. on the questionnaire data to determine the validity of each question with respect to TQM i.e. the association between the questions and TQM; and
2. on the overall TQM and financial indicator results.

6.7.1. Statistics Used

6.7.1.1. Association of Variables

The type of data involved yields the type of statistical tests to be used. For the dichotomous questions, univariate statistical techniques are used. These are appropriate when there is a single measurement of each element in the sample, or when there are several measurements of each element, but each variable is analysed in isolation (Malhotra, 1999, p.434). Nonmetric data are obtained from the questionnaires in the form of “Yes”, “No”, or “Don’t Know” answers. There are also two or more independent samples involved. All this information leads to the use of chi-square testing.

The chi-square statistic is used to test the statistical significance of the observed association in a cross-tabulation. It assists in determining whether a systematic association exists between variables (Malhotra, 1999, p.465). Chi-square is used on each section in the questionnaire. This involves only the dichotomous questions in each section and not the itemised questions.

Malhotra (1999) states that whenever inferences are drawn about a population, there is a risk that an incorrect conclusion may be reached. The probability of the sample results leading to the rejection of the null hypothesis when it is in fact true is called the level of significance (Malhotra, 1999, p.456). The level of significance is set at 0.05 (5%).

6.7.1.2. Multiple Linear Regression

The general purpose of multiple regression is to learn more about the relationship between several independent or predictor variables and a dependent or criterion variable (StatSoft, 2003). In this study, multiple regression is used to check the link between any financial indicator and the level of TQM implemented. Even though the sample size is adequate, the researcher is aware that a total of ten observations (ten organisations) are not enough to find a potentially significant association between

TQM and financial performance, but it is attempted nevertheless. Regression is performed subject to assumptions (Nau, 2006):

1. linearity of the relationship between dependent and independent variables;
2. independence of the errors (no serial correlation);
3. homoscedasticity (constant variance) of the errors versus time and versus the predictions (or versus any independent variable); and
4. normality of the error distribution.

Nau (2006) describes that if any of these assumptions are violated (i.e., if there is nonlinearity, serial correlation, heteroscedasticity, and/or non-normality), then the forecasts, confidence intervals, and economic insights yielded by a regression model may be (at best) inefficient or (at worst) seriously biased or misleading.

6.7.2. Statistical Package

The statistical calculations used in the analysis of data are computed in StatsDirect (StatsDirect, 2005), Microsoft Excel, and GraphPad InStat (GraphPad, 2005).

6.8. Method of Analysis – Total Quality Management

This section discusses the manner in which the final results are obtained for the TQM scores. The questionnaire is designed in the way that would closely follow the eight principles of TQM. Questions are formulated for each principle and placed under their respective headings (see chapters three and six). The analyses of the two different types of questions (dichotomous and multi-scale) are handled differently.

For the dichotomous questions, each question for each organisation is counted for each individual section. These tables of answers can be seen in Appendix S. Once the results are tabulated, chi-square statistical analysis is used to test results (see chapters six and seven above). With the significant results, only the positives are counted i.e. only the ‘Yes’ answers. This is because:

- only interested in definite answers;

- only interested in positive answers; and
- there is no negative marking.

In this way, the TQM score reflects the answers that increase the score for the organisation.

There are two exceptions to this:

1. Section A – Question 1 – question is asked to test awareness of quality. 'No' implies that the respondent is aware that they do not have ISO certification, thus a 'Yes' or 'No' increases the TQM score.
2. Section F – Question 5.3 – question reveals if respondents know about internal and external customers. The 'No' is the positive answer as it indicates they do have customers.

For the itemised scale questions, each answer to each question is assigned a number i.e. 2, 1, 0, -1, or –2, depending if there is a positive or negative answer towards TQM in the organisation. Cronbach's alpha is the statistical approach used to assess and confirm reliability of the answers.

The final result for each organisation's section is then obtained using the number of questions in the section and the number of questionnaires for the organisation. This result is then used with the sections' weighting to obtain a final section score. The different section scores are then added to obtain a total TQM score for each organisation. How the section weightings are derived at is discussed in section 6.5.

6.9. Method of Analysis – Financial Performance

Financial performance is measured using six financial indicators – percentage change in sales, percentage change in return on sales, return on assets, return on equity, total asset turnover, and percentage change in share price. This section follows the way of obtaining the results for these indicators.

The financial statements from each organisation for the period of six years (2000 to 2005, inclusive) are obtained and subjected to financial analysis. Different weighting

is decided upon for each year as shown in Table 5. The latest year (year of study) is given the highest weighting of 50%. There are a few reasons to opt for this weighting, which include:

- the highest weighting is given to the year of study i.e. when the cross sectional study was done to provide the most accurate results. There was no indication given by organisations when any TQM principles started being implemented. The further back in time the organisation is studied, the less certain it is that the current management philosophies are in place; and
- the lowest weighting is given to the last two years (2001 and 2002). This is because the IT industry suffered a big correction on the stock market after the "dot-com bubble" burst in March 20, 2000 (Wikipedia:Dot-Com, 2006). The years following the 2000 correction are given the lowest weighting. A good organisation might have only had bad financial indicators because of the overall sector's performance. This implies that the financial results might have not best depicted the situation of the organisation at that time.

Table 5: Year Weightings

Year	Weighting
2005	50
2004	25
2003	12.5
2002	6.25
2001	6.25
Total:	100

Some figures need to be excluded from the calculations of the indicators. These, if included, may skew results that are not indicative of the operations. These include:

- restructuring of organisations often involves restructuring its asset composition, e.g. selling off subsidiary organisations. This would indicate a drop in its total asset base. When the change in assets lowers by over R1bn in the balance sheet, values in that year are excluded; and
- percentage change increase from a value close to zero produces large percentage increases, e.g. from 0.02 to 0.2 indicates an increase of 900%. This distorts results even though the change in value is less significant. These values are excluded.

6.9.1. Financial Ratios

Organisations use financial ratios to assess their overall performance. Some of these financial ratios appear in the annual reports of the organisation. Because the organisations determine these ratios, there may not be a set standard procedure to calculate them i.e. different organisations may calculate ratios differently. Different organisations also list different financial ratios because different methodologies and figures may be used. Consequently, the ratios provided by the organisations are not used in the study. Calculations are performed on the original financial statements (income statement and balance sheet) so that the method may remain the same for each organisation and there is less chance of manipulation of the data. The balance sheets and income statements from each annual report for the organisations are not included to keep the anonymity of these organisations. Certain calculated figures obtained from the annual reports can be found in Appendix T.

6.9.2. Share Price

The share prices used to calculate the percentage change year on year are obtained from a 30-day moving average (average value of a security's price over the last 30 days (Investopedia, 2006)) for the month of September in each year. This month corresponds to the time when questionnaires were being completed in 2005.

When calculating the percentage change in share price, certain anomalies that may skew results are eliminated. These are:

- percentage share price increases from around zero result in large percentage gains even though minimal in monetary terms, e.g. 1c to 10c implies a 900% gain. These increases are excluded; and
- data on share prices that prior to name changes of organisations were not obtainable, therefore, only recent data is used.

Using the method of analysis for both TQM and financial performance, results may be obtained. The data collection, questionnaire evaluation, statistical analysis, and method of analysis results are discussed in the next chapter.

PART FOUR: ANALYSIS OF RESEARCH FINDINGS

Chapter Seven: Results

7.1. Introduction

The findings of the empirical survey undertaken are presented in this chapter. TQM scores are discussed first, then the financial performance results, concluding with results linking the two.

Statistical results are discussed in the relevant sections. These are presented to build a case for testing objectives and the hypothesis.

7.2. Total Quality Management Scores

7.2.1. Cronbach's Alpha

Cronbach's alpha is used to ascertain the questionnaires' internal reliability. It is necessary to group questions to provide a sufficient sample size. Cronbach's alpha is used on each principle of TQM in the questionnaire when there are more than one multi-item questions. Sections with less than five scale questions are grouped together to form sections with at least five questions. Internal consistency reliability is then computed for each grouping or section. This reveals reliable questions in all cases. As an example, sections B, D, E, and G have two or less multi-item questions and need to be combined together with a section that contains more than two multi-item questions to minimise systematic variation in the scales. The result of section A (three questions) with sections B, D, and G provide a reliability of 0.61, which is just above the required 0.60. Section C contains seven multi-item questions with a reliability of 0.76 and doesn't need to be grouped with any other section. Sections F and G are combined to provide a scale reliability of 0.60.

The overall scale reliability of the entire questionnaire is 0.84. There is also no significant indication for the need to eliminate any question from the questionnaire to increase the reliability of the data. The results of all Cronbach's alpha statistical tests

can be seen in Appendix U. It is concluded that multi-item questions are reliable for further use in calculating the overall TQM principles of each organisation.

7.2.2. Chi-Square Statistic

The chi-square statistic is used to test the statistical significance of the observed association between questionnaire parts. The results for the chi-square test for independence indicate that the null hypothesis of no association could be rejected indicating that the association is statistically significant for each section except section C (strategic quality planning) where there are only two dichotomous questions and hence the sample size is too small to verify the association. The overall result for all the questions and sections indicate a statistically significant association between the variables i.e. the questions are dependent on each other and hence dependent on TQM (Appendix V shows the chi-square results). This verifies that the questions formulated are able to measure TQM in a correct way.

7.2.3. Treatment of Missing Responses

Missing responses represent values of a variable that are unknown due to the fact that the respondent's answers are not properly recorded. Treatment of missing responses poses problems, particularly if the proportion of missing responses is more than ten percent (Malhotra, 1999, p.428). The following options are used for the treatment of missing responses:

- Removing the question – only two questions had to be removed. The first, Question 1 in Section E, because it is unanswered by fifty percent of the respondents. It is obvious that people do not know how often quality is measured to gauge the overall direction of quality within the organisation. The question made no space for "Don't Know" possibility forcing a clear answer on the respondent. The second, Question 4.2 in Section D, due to that fact that over 50% of the respondents answered it even though the answer to Question 4 was 'No' therefore they were not supposed to continue to Question 4.2. The

purpose of the question is to test training with regards to quality and not just any training the respondent undertook.

- Substitute a neutral value when question is left unanswered – this would imply putting in a "Don't Know" or "Neither Agree or Disagree" (depending on the type of question and answer required – dichotomous implies "Don't Know" and itemised scale implies "Neither Agree of Disagree") when questions are left blank. Of 96 questionnaires, 28 questions were left blank, excluding the above point (removing the question). In each questionnaire, different questions were left unanswered, if any, therefore one question never constituted ten percent.

7.2.4. Total Quality Management Scores

The final TQM results can be seen in Table 6 and Table 7, the latter displaying the TQM scores in descending order for ease of readability.

Table 6: Final TQM Scores Displayed By Section

	Section								
Company	A	B	C	D	E	F	G	H	**Total Score**
A	2.92	3.89	1.00	5.36	7.77	14.09	1.72	0.00	36.75
B	15.90	5.41	6.05	7.50	11.04	13.11	4.26	0.83	64.10
C	6.53	1.88	3.58	7.14	8.47	11.59	2.34	0.13	41.66
D	3.96	4.31	0.63	5.54	6.59	10.15	1.87	0.38	33.42
E	14.59	5.27	4.96	7.50	8.96	12.20	2.70	0.96	57.14
F	5.74	2.60	2.73	7.62	6.30	8.79	2.03	0.00	35.79
G	4.58	2.01	2.79	8.21	3.61	10.00	1.72	0.13	33.05
H	7.31	4.63	3.56	6.43	3.89	13.03	1.41	1.44	41.69
I	16.52	3.71	5.59	9.16	10.07	12.07	5.11	0.41	62.64
J	5.83	8.34	7.00	4.29	7.50	20.00	5.63	0.00	58.59

Table 7: Final TQM Scores Displayed In Descending Order

Score	Company
64.10	B
62.64	I
58.59	J
57.14	E
41.69	H
41.66	C
36.75	A
35.79	F
33.42	D
33.05	G

Organisations B and I are the only organisations achieving scores above 60 – 64.10 and 62.64 respectively – indicating that they have the highest number of TQM practices in place. Organisations J and E are in the upper 50s, just coming short of the 60s level. On the other side of the scale, the remaining organisations A, D, F, and G are in the 30s bracket faring relatively poorly in quality practices applied (Company J only provides one questionnaire and hence may give a skewed result).

Each individual TQM principle is also examined, the analysis of which is in chapter eight. The TQM principles, as defined in this study, are implemented when the score for that section is more than half of the weighting (e.g. if the weighting of the section/principle is 20, an organisation with a result of 10 or more is considered to have that principle in place). Table 8 shows the results using this rule.

Table 8: Implementation of TQM Principles

Section/Principle	Organisations
Top Management Involvement	3
Information Systems	3
Strategic Quality Planning	3
Human Resource Development	5
Management of Quality	6
Customer Focus and Satisfaction	9
Management Structure and Teams	3
Cost of Quality	1

7.3. Financial Performance Scores

This section displays the results obtained from the financial statement analysis. The financial scores are described under the headings they pertain to – sales, ratios, and share price.

The final financial performance results are displayed in Table 9. The data source for the calculations can be seen in Appendix T. Negative values on a financial ratio, once calculated, are zeroed e.g. Company G obtained negative values for ROA and ROE so a zero is indicated on the table.

Table 9: Financial Performance Indicators and Scores

Company	Percentage Change in Sales	Percentage Change in Return on Sales	Return on Assets	Total Asset Turnover	Return on Equity	Percentage Change in Share Price
A	40.18	27.81	0.18	0.93	0.24	99.86
B	29.95	17.72	0.06	2.52	0.16	147.86
C	27.29	16.09	0.09	1.33	0.14	18.16
D	7.63	-3.22	0.15	0.92	0.18	50.85
E	7.39	7.93	0.06	1.88	0.16	26.20
F	16.20	-4.46	0.02	1.49	0.00	47.63
G	16.56	21.90	0.00	1.91	0.00	44.94
H	-21.37	-10.04	0.00	1.05	0.00	0.00
I	-1.78	18.01	0.09	1.30	0.18	50.00
J	11.81	0.00	0.00	1.79	0.00	4.36

7.3.1. Financial Ratios

7.3.1.1. Sales Ratios

A graphical representation of the two sales columns from Table 9 can be seen in Figure 15. Examining the turnover that each organisation produces reveals organisations A, B, C, and G with relatively good percentage increases, and organisation H as the only organisation obtaining an overall negative increase in sales and return on sales, year on year since 2000. With respect to return on sales alone, organisations D, F, and H produce an overall negative result.

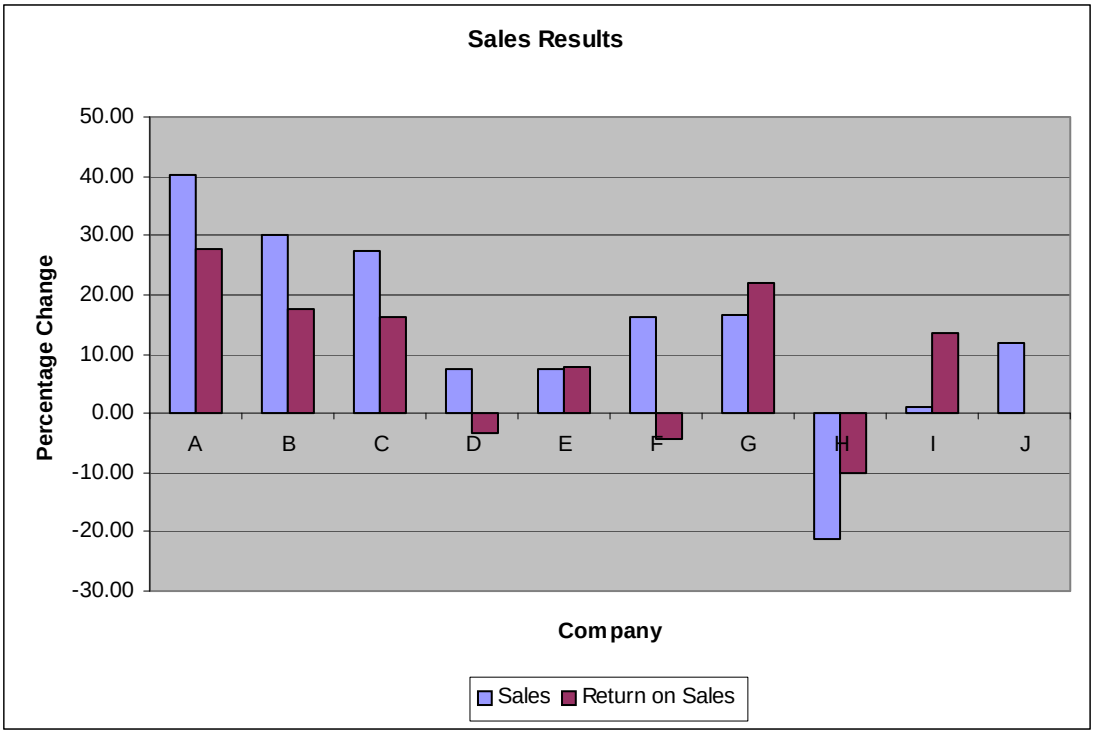

Figure 15: Percentage Change in Sales Results

7.3.1.2. Asset Management Ratios

Examination of the total asset turnover financial ratio column reveals positive values throughout. Figure 16 shows this. Organisations B, E, and G produce the most amount of income for every Rand of assets.

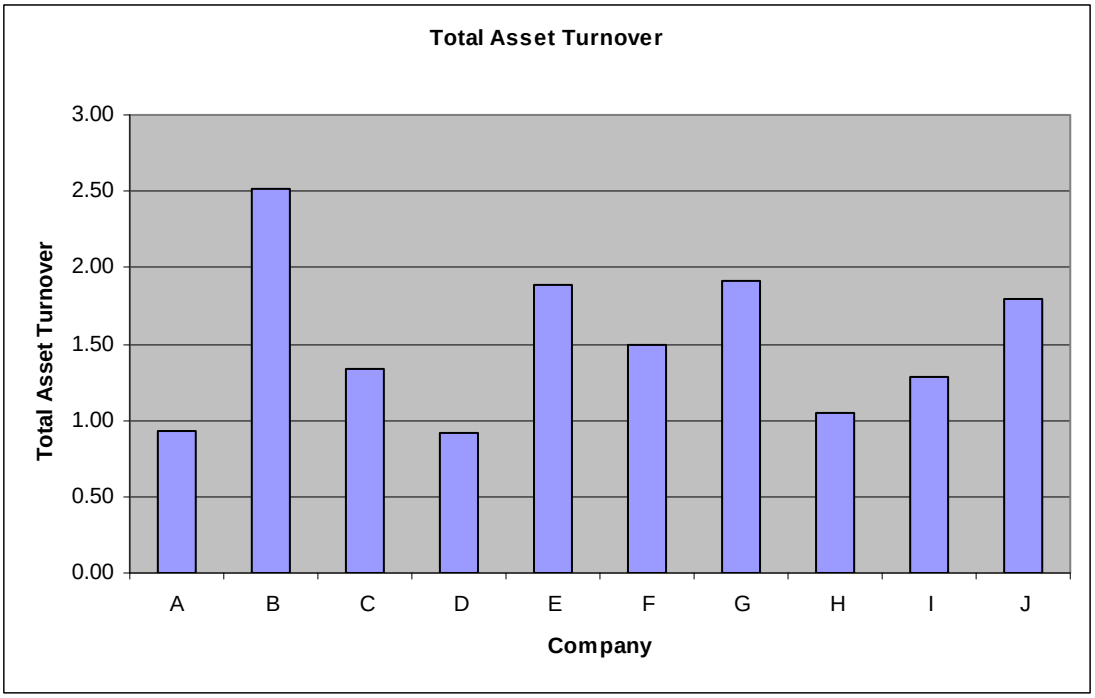

Figure 16: Total Asset Turnover Results

7.3.1.3. Profitability Ratios

A graphical representation of the returns financial ratios indicators can be seen in Figure 17. Return on assets (ROA) indicates that the overall management efficiency of the organisation is best in A and D participants. These organisations generate the most value from its total asset base.

Return on Equity (ROE) figures are generally better and have a tighter range (14% to 25%) than the ROA figures. The figures indicate that organisation A is managed most effectively in the interest of shareholders. A value of 24% implies that it generates 24 cents in profit for every Rand in equity.

Organisations G, H, and J obtain negative values for ROE and ROA (refer to Figure 17).

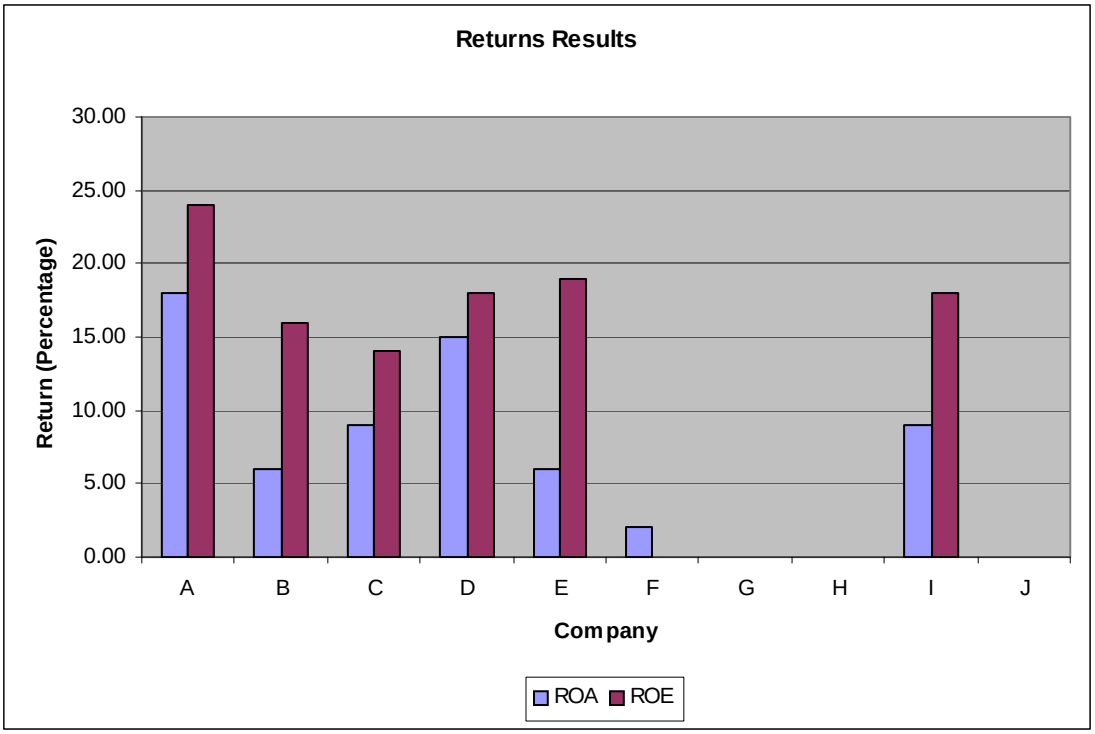

Figure 17: Return on Assets and Return on Equity Results

7.3.2. Share Price

Figure 18 shows the graphical representation of the share price percentage change. Organisations A and B show the highest gains in share price.

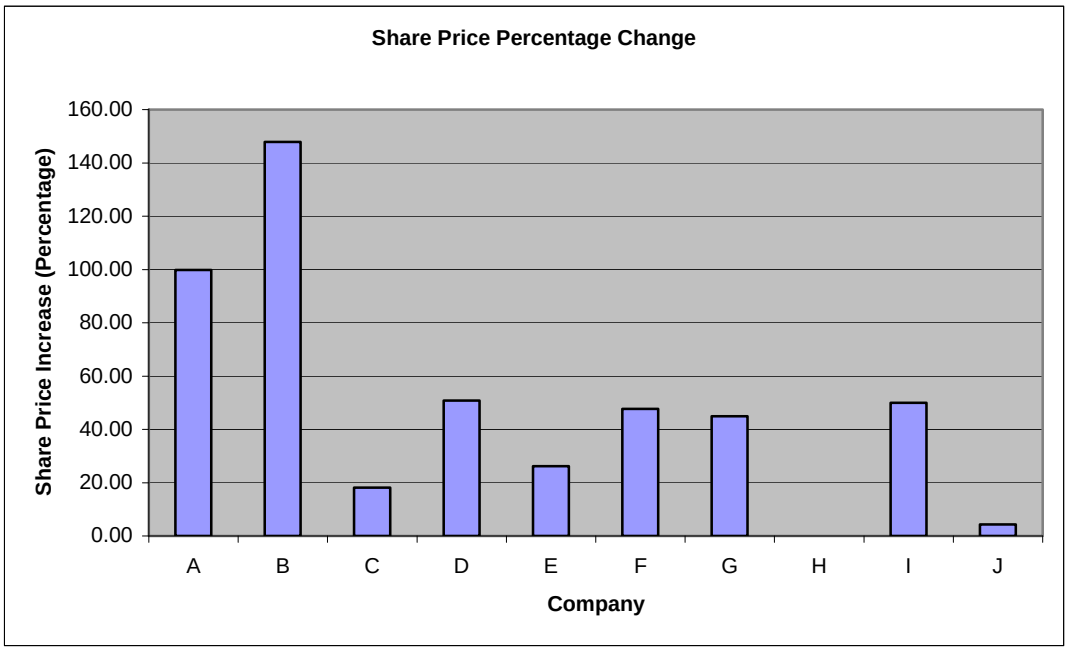

Figure 18: Percentage Change in Share Price

7.4. Multiple Linear Regression

Multiple regression is used to interpret the data from the TQM scores and find which, if any, financial indicators are associated with TQM. Tests associated with multiple regression are R-squared (R^2), F significance, regression coefficients, and P values.

Significance of the Test – R-Squared and F Significance

Before analysing and interpreting the independent variables, the overall significance of the test used must be examined to determine whether the model for obtaining those results is significant. The *R-square* value is an indicator of how well the model fits the data (e.g., an *R-square* close to 1.0 indicates that the test accounted for almost all of the variability with the variables specified in the model; values of .60 or better are considered acceptable) i.e. the R-squared of the regression is the fraction of the variation in the dependent variable that is accounted for, or predicted by, the independent variables (StatSoft, 2003; Malhotra, 1999, p.643; Princeton Services, 2005). The value of 0.73 obtained here (as seen in Table 10) implies that 73% of the data are accounted for with the variables specified (financial indicators) explaining thus the TQM results accurately.

The output of multiple regression also indicates if the model allows predicting TQM implementation at a rate better than chance. This is denoted by the significance level of the overall F of the model. If the significance is .05 (or less), then the model is considered significant. In other words, there is only a 5 in a 100 chance (or less) that there is no association between TQM and financial results (Abrams, 2005). The F significance can be seen in Table 10 under analysis of variance (ANOVA). It shows a value more than 0.05 implying no statistical significance.

Determining Significant Variables – P-Values

Standard multiple regression tests the significance of each independent variable on the dependant variable. The significance levels given for each independent variable indicate whether that particular independent variable is a significant predictor of the dependent variable, over and above the other independent variables (Abrams, 2005).

Table 10: Summary Output of Multiple Linear Regression (TQM and Financial Indicators)

Regression Statistics	
Multiple R	**0.854661361**
R Square	**0.730446042**
Adjusted R Square	0.191338125
Standard Error	11.36669914
Observations	10

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	6	1050.346062	175.0576769	1.354916185	**0.43329179**
Residual	3	387.6055483	129.2018494		
Total	9	1437.95161			

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	44.58735073	40.68614172	1.09588545	0.353222355
Sales	0.080003241	0.57157472	0.139969873	0.897552764
Return on Sales (ROS)	-0.257417957	0.517570036	-0.497358693	0.653103722
ROA	-424.7962675	468.3289091	-0.907046862	0.431249996
Total Asset Turnover	-0.470581656	26.97127541	-0.017447512	0.987175111
ROE	296.4786387	230.8619976	**1.284224523**	0.289254119
Share Price	0.001690674	0.150084111	0.011264845	0.991719387

The P value indicates the significance level of each independent variable. A P value of 5% (.05) or less is the generally accepted point at which an independent variable is significant and implies there is only a 5% chance that results obtained would come up in a random distribution. Assuming the model is specified correctly and significant, it can therefore be said with a 95% probability of being correct that the variable is having some effect (Princeton Services, 2005; Abrams, 2005). Results from multiple regression with P-values can be seen in Table 10. The overall equation is:

$$TQM = 44.58 + 0.08Sales - 0.26\,\mathrm{Re}\,turnOnSales - 424.80ROA - 0.47TotalAssetTurnover + 296.48ROE + 0.002Share\,\mathrm{Pr}\,ice$$

The multiple regression highlights the most influenced financial indicator by TQM using the t-Stat values. ROE has the highest t-Stat value so it is first tested against the TQM scores (Table 11) and secondly against each principle of TQM (Appendix W) to determine if any one TQM principle is significantly associated with ROE. The equation for ROE and TQM principles, derived from Table 11 is:

$$ROE = 2014.83 + 111.1TopManagement - 51.76InformationSystems - 6.32QualityPlanning - 226.82Human\,\mathrm{Re}\,source - 61.31\,\mathrm{Pr}\,ocesQuality - 19.21CustomerSatisfaction - 73.46ManagementStructure - 659.83CostofQuality$$

Table 11: Summary Output of Multiple Linear Regression (ROE & TQM Principles)

Regression Statistics	
Multiple R	0.95667718
R Square	0.915231226
Adjusted R Square	0.237081037
Standard Error	132.644056
Observations	10

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	8	189963.6544	23745.4568	1.349599603	0.585594245
Residual	1	17594.4456	17594.4456		
Total	9	207558.1			

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	2014.831809	6301.608743	0.319732927	0.802991225
Top Management	111.1039351	262.5636183	0.423150534	0.745159138
Information Systems	-51.76237253	314.114328	-0.16478832	0.896026913
Quality Planning	-6.321254396	63.07702323	-0.10021485	0.936413545
Human Resource	-226.8169669	695.6006658	-0.326073533	0.799335814
Process Quality	-61.30966137	248.7244712	-0.246496298	0.846142782
Customer Satisfaction	-19.20917181	44.19626319	-0.434633393	0.738984722
Management Structure	-73.45797136	106.6642382	-0.688684161	0.616060345
Cost of Quality	-659.8246451	816.4626708	-0.808150414	0.56729528

The R-Square value of the multiple regression in each case indicates that most of the data are accounted for with the variables specified in each case. However, neither the multiple regression between TQM and financial indicators nor the regression between ROE and TQM principles are significant. Considering this, there can be no statistical significant variables. This may be attributed to the lack of observations.

7.5. Interview Results

Interview questions were not strictly pre-structured. Information was gathered from different angles in an open dialogue from representatives about their views of quality management in general and in their organisations. The information obtained from this is qualitative in nature and is discussed. Considering this, the information is not evaluated for reliability or validity. A summary of the data can be seen in Table 12.

Company A

Company A has a quality assurance department which has been implemented for over five years but it is not making an impact on the organisation because only one individual is involved, with lack of communication to top management. Nevertheless, they are trying to implement some of the principles of TQM, especially in the development side of the business where quality is directed at the customer.

Company B

Quality is important at Company B. They have an organisation-wide quality assurance department incorporating the different divisions with close ties to top management. They are ISO9000:2000 certified and continually improving on that, currently seeking new quality management entities to improve quality and increase their customer base. They are implementing quality systems such as: control sheets and quality control at every step of the products life cycle; feedback systems between employees, the quality department, and top management; cross-functional training so every employee is aware of their job description and the importance of quality; and high levels of top management involvement.

Company B feels that cost of quality is hard to measure in the IT industry but that percentage targets work better, e.g. reworks must be less that 5%.

Company C

Company C is customer oriented because it has continuous interaction between the developer and the customer to provide for the unique needs of each customer. They also have teams dedicated to clients meeting their needs. They have an organisation-wide quality assurance department so that quality, as stated by the customer requirements, is met at every stage of the product. Other client satisfaction initiatives include user acceptance tests from a client's point of view; and employee incentives for meeting customer demands.

The development and manufacturing arena uses a global accredited best practice, CMMI, to provide stringent quality practices to compete internationally. The other departments are however not accredited.

Company D

Company D have had a quality assurance department since 1985 aimed at customer training. This department is however not organisation-wide and tends not to include other departments or other employees in quality management initiatives. The principles of TQM are not being applied to the organisation and human resource development and management with quality, needs to be improved. There is no quality training, quality circles, or employee incentives, rewards, or involvement.

Company E

Company E is ISO9000:2000 certified and follows its eight quality management principles. It has effective departmental links and communication between all divisions, suppliers, and customers. They regard their core competence as flexibility and service towards the customer. They have five divisions dealing with different groups of customers – education, corporate, export, retail, and dealer – to meet the requirements of each. This allows the organisation to focus on separate markets to provide the highest level of customer satisfaction at each level. Other positive quality management issues are:

- on-site technician for clients/customers;
- service training, team building, and skills development;
- customer surveys;
- quality culture with top management involved;
- targets and goals based on customer requirements;
- continuous improvement on information systems; and
- international benchmarking.

Company E agrees with organisation B that a cost of quality is hard to measure in the industry and uses target figures such as minimum percentage reworks. Another problem with quality is that people with too much self-interest don't fit in the quality culture of the organisation and it takes time to find the type of people that do fit.

Company F

Company F has recently examined various quality management initiatives and is currently forming a quality assurance department, its main aim being the implementation of CMMI for their products. The need for a quality best practice is

evident as reworks are as high as 40% and need to be brought down to improve customer relationships and increase their customer base. They also feel quality brings inherent and indirect benefits.

Company G

Company G claimed that a quality best practice is important and they are looking to implement an organisation-wide best practice but are facing organisation structure problems, close to being fixed. There is currently a lack of communication between the groups and levels in organisation G. It was also indicated that there are external influences that need to be taken care of to remain competitive in the South African industry such as BEE and corporate governance that detract attention away from quality.

Company H

Company H has developed their own manuals and procedures dealing with quality management. They have opted not to use an international best practice due to the nature of their product. Because of this, there is a lack of a quality culture because the quality is aimed at the product and not the organisation.

Company I

Company I has the highest number of quality management initiatives in place aimed at providing a TQM culture throughout the organisation. They are implementing ITIL, Six Sigma, South African Excellence Model (SAEM), Investors in People (IiP), ISO9000:2000, and most recently looking into CMMI and COBIT. They have an organisation-wide quality assurance department aimed at a quality culture throughout all levels of the organisation, its customers, and its suppliers. The representative indicated that potential customers are educated on these best practices to show how stringent their practices are, the customer then understands them, and joins organisation I increasing organisation I's customer base. Company I indicates that being able to manage projects unique to customer requirements is the next aim in the IT industry. An overall quality management initiative needs to be imposed on each project to provide the best quality for each customer's requirements.

Company J

Company J also implements quality management best practices such as ITIL to provide an overall organisation-wide quality culture and deems COBIT as the most important in the IT industry. They agree with organisation I that the IT industry is becoming more project based with unique requirements for each client. Considering this, COBIT can provide overall IT governance that takes into account different projects.

Summary

The interview provided more insight into quality at each of the investigated organisations. From the interviews, it became clear of underlying concepts facing the IT industry and quality management in particular. The uses of more specialised quality management entities were highlighted. The main reason given is the need to manage unique projects for different clients and requiring a quality framework for each project.

The idea of cost of quality is also found not to be practiced in the IT industry due to the complexity of its calculation relating to IT issues but performance targets are rather set.

Certain external factors that are affecting quality management, its implementation and effectiveness are also discovered. Table 12 provides a summary of the information gathered from the interviews.

Table 12: Information Gathered from Interviews

CHARACTERISTIC	COMPANY									
	A	B	C	D	E	F	G	H	I	J
Quality Department	X		X	X		X	X	X		
Organisation-Wide Quality Department		X			X				X	X
ISO9000:2000 Certified		X			X				X	
CMMI Accredited			X			X			X	
Developed own Quality Management Procedures								X		
Analyses ITIL, COBIT to Further Quality									X	X
Need Quality Management for IT Projects			X						X	X
Cost of Quality vs. Performance Targets (PT)		PT			PT	PT				

7.6. Extreme Company Analysis

To examine any link between TQM and financial performance, the comparisons between two extremes – organisations with the minor and major TQM implementation respectively - are discussed to check if there are any noticeable links. Each organisation is not discussed in terms of its results, for a brief overview of the organisations one after the other, see Appendix X.

7.6.1. Company B vs. Company G

Company B is the top performer in terms of its quality score. It obtained 64.10, 1.46 points above the second place competitor. Apart from CoQ, it excels in the implementation of all TQM principles and, most importantly, it is one of only three organisations implementing sound top management involvement. Company B also excels in the financial performance indicators. It is in the top five for all the financial elements coming first for percentage increase in share price and total asset turnover.

Company G is the lowest performing organisation obtaining a score of only 33.05 on the quality scale. This is, apparently, because the organisation had to undergo restructuring of the business due to the number of acquisitions. Because the organisation grew too quickly, a quality management initiative was put on hold. Company G did well in the sales indicators and total asset turnover financial ratio. Negative results are obtained in ROE and ROA showing poor return for the various investments made (assets and shareholder's equity) and indicate some poor management.

The fact that Company G attains the lowest TQM score is not wholly reflected in the financial results. The percentage change in sales figures for Company G indicate an increase of almost 22% year on year, the second highest result overall. Company B is not too far behind at 18% (Figure 19). The reverse occurs for percentage change in sales where organisation B outperforms organisation G. With respect to the total asset turnover financial ratio, organisation B is marginally better than organisation G being

the second highest overall (Figure 20). The largest variance is in the two return financial ratios – ROA and ROE. Figure 21 shows this difference clearly. Regarding percentage change in share price, organisation G obtains average results (45%) whereas organisation B obtains the highest percentage increase at 148%. These results show that a high involvement in TQM may result in improved financial performance.

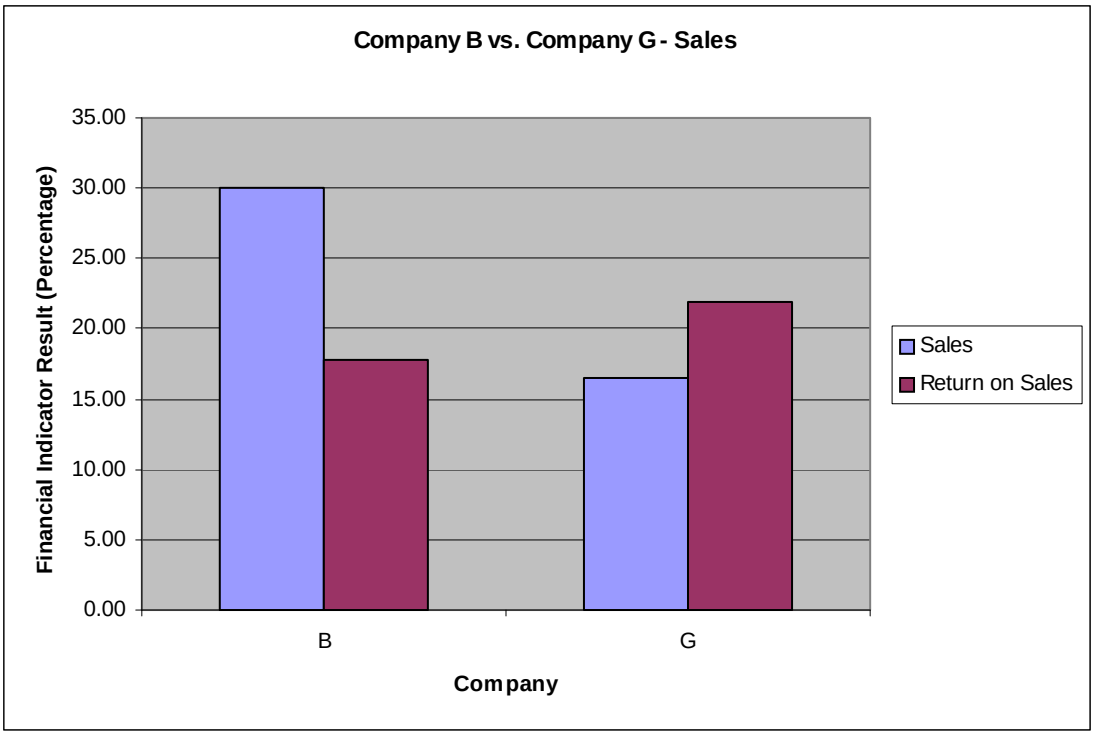

Figure 19: Company B vs. Company G, With Respect To Sales Results

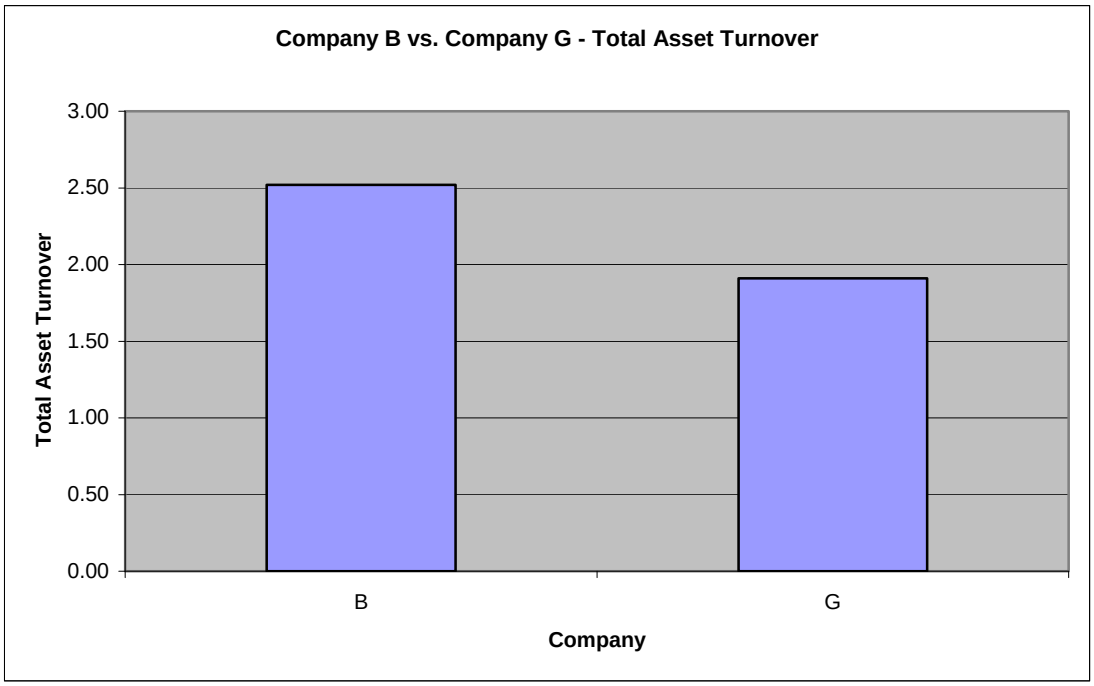

Figure 20: Company B vs. Company G, With Respect To Total Asset Turnover

Figure 21: Company B vs. Company G, With Respect To ROA and ROE

Regarding TQM principles, Company G, however, does show strength in the implementation of human resource development (8.21 points out of a possible 15 – second highest of the ten organisations). With better management involvement and proper quality planning (one of the lowest scores in the study), the correct operation

of which is important for other principles, this organisation could have scored higher. This again points to poor management, as did the weak results in ROA and ROE.

More detailed examination of the financial ratios indicates that a trend is forming for both organisations. Trends in financial ratios indicate the overall direction of the organisation i.e. performance is getting better or worse. Company B has a positive upward trend for its ratios. Company G is the only organisation, in this research, with an overall negative trend in its ratios. This is a good indication of the possible positive link to the long-term effects of functioning TQM. With the current trend, Company B is getting stronger, improving sales, becoming more efficient, increasing returns, and improving operations. Company G is doing just the opposite needing to examine its operations to undo the trend.

7.6.2. Company I vs. Company D

Company I has the second best score of 62.64 indicating many quality principles in place. It scores most where quality stems from – top management and employees (human resource development). The financial indicators are mostly above average - excelling in ROA and ROE, but failing to make an impact on sales figures and share price increases. This is because it is a much larger, well established organisation and hence:

- has a larger market capitalisation – not interested in new sales but maintaining current sales figures. The sales of organisation I are a factor of eight times higher in six of the ten organisations studied. Company I's sales are 74 times higher than organisation D's; and
- has in place an experienced quality department creating good quality frameworks for over five years - the advantage of an already-run TQM might have been incorporated into the previous sales figures and not only in the years of this study bringing about no major percentage increases. The fact that sales are already 74 times higher also highlights this.

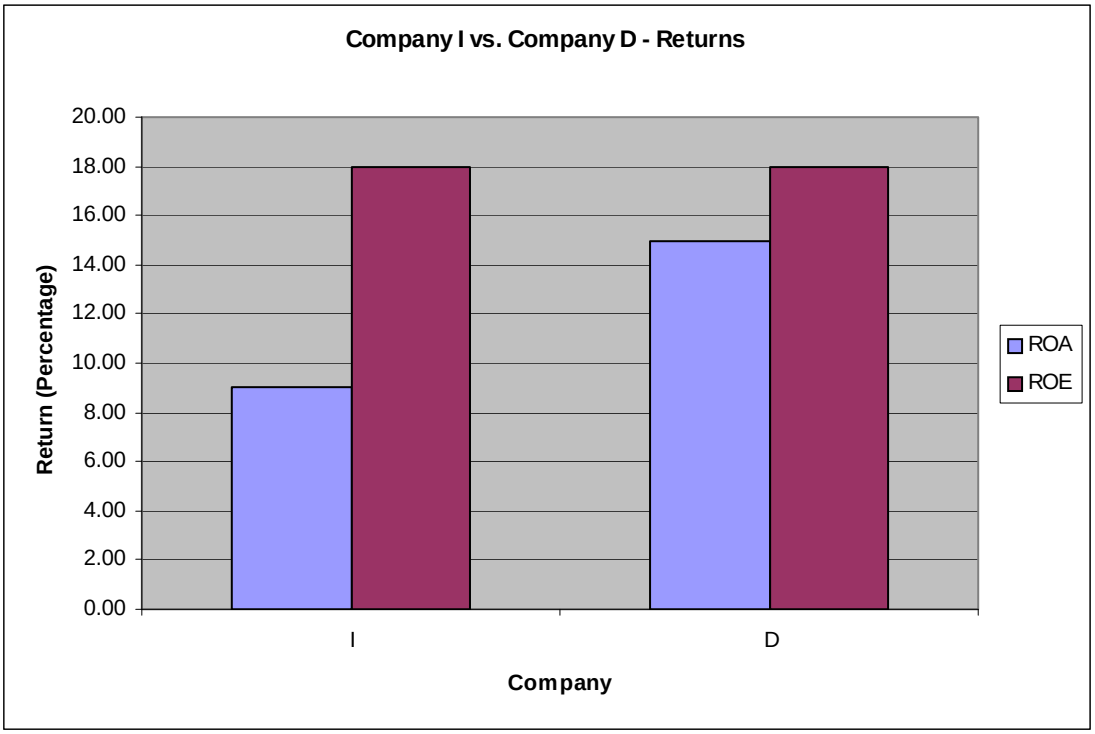

Figure 22: Company I vs. Company D, With Respect To ROA and ROE

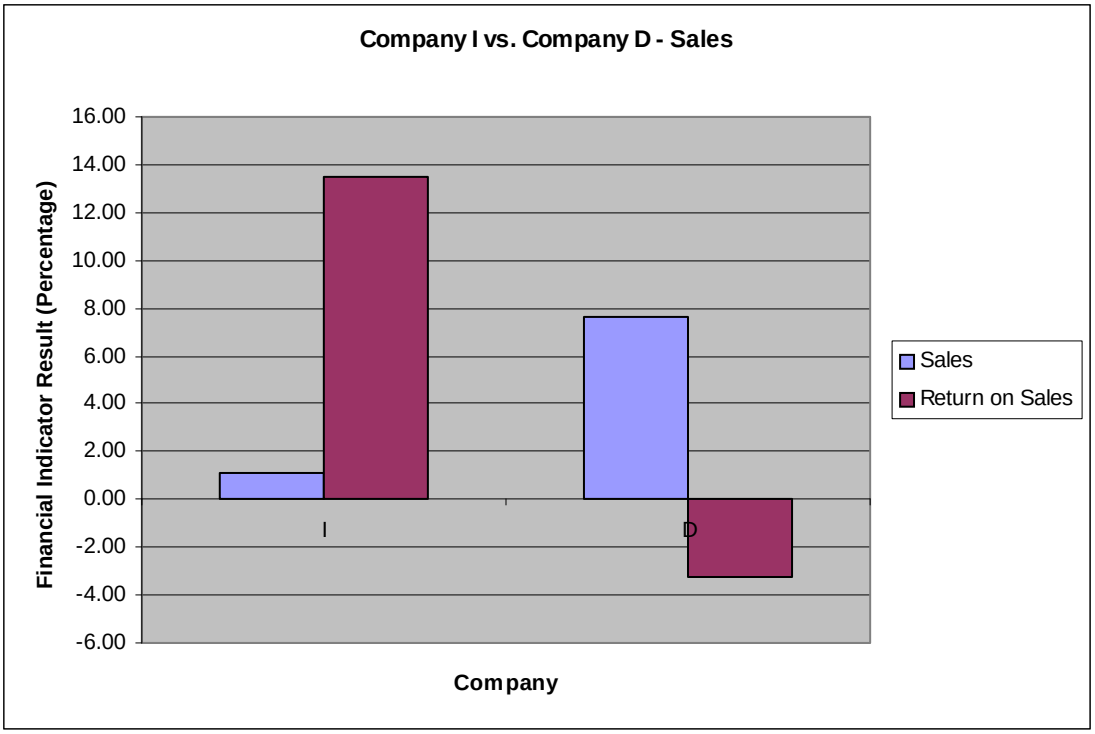

Figure 23: Company I vs. Company D, With Respect To Sales Results

Company D scores the second lowest score of 33.42. It is the lowest performer in quality planning and the second lowest in human resource development and involvement of top management. These facts may point towards a non-healthy work

environment with no consideration to quality, as there is neither drive from management nor a drive for quality planning. Nevertheless, Company D performs well for percentage increase in sales but obtains a negative return on sales figure. It further performs well with regards to both the return financial indicators - ROA and ROE.

Overall, results are better for Company I indicating stability and an improving trend in its financial ratios. Company I's return financial ratios are slightly below those of Company D (Figure 22). The sales indicators are mixed as Company D excels in percentage change in sales, but obtains negative percentage gains with respect to percentage change in return on sales (Figure 23). Percentage change in share price results are similar even though share price of Company I is already twice as high as Company D's and hence a greater percentage movement up is harder to obtain. Considering this and the fact that Company I is much bigger with a 74 times greater turnover, Company I outclasses Company D. This case, as the previous ones, points out that a higher involvement in TQM and other quality management entities may result in improved financial performance.

Chapter Eight: Discussion

8.1. Summary of the Research

This research uses questionnaires and interviews to analyse TQM at selected organisations and determine any current trends with regards to quality management in the IT sector. TQM is defined by an in-depth literature survey that focuses on original theorists' works, modern TQM literature, past and current quality entities, and past research. Eight core principles are identified and used to depict TQM. Questions are formulated on each principle in the questionnaires, which are then used to determine the level of implementation of TQM at the various IT organisations. The anonymity of responders and their results are guaranteed.

The questionnaire structure, principles, and their weightings are based on the criteria set by the Malcolm Baldrige Award. The questions are formulated on the strength of the literature survey along with the case studies used by Ross (1994) to evaluate TQM at organisations. Cronbach's alpha and chi-square statistical tests are used to validate the questionnaire.

Out of 17 possible organisations in the IT sector that could have been approached (within the boundaries as described in chapter six), 10 positive respondents are investigated indicating a response rate of 59%. That amounts to 42% of all 24 organisations in the IT sector. A better response would have provided more observations influencing the final results by maybe providing a more significant conclusion.

8.2. Total Quality Management

TQM has revolutionised the way many organisations are operating as it has become integrated into mainstream management practices (Flynn, 2005, p.4). Its hallmark is a commitment to exceed customer expectations on an ongoing basis by continuously improving the organisation's products and services and the processes that make and support them. A core concept of TQM is viewing the organisation as a system tied

together by processes that cross conventional functional boundaries. Every traditional department should be involved in the organisation's TQM efforts to obtain the full benefits of this powerful management technology (Stoner, 1994, p.1).

TQM should not be appreciated only as a set of tools, methods, and practices but rather, more importantly, containing a set of generic "profound and valuable knowledge" (borrowing Deming's term) which can be tailored in a flexible manner to suit organisational specific needs, including quality and innovation. Parajogo and Sohal (2004) found that the success derived from TQM essentially came from the strategic adaptation of the use of its principles rather than by simply adopting its tools and techniques.

8.3. Objective One

The first objective of the study is to determine the extent of application of TQM principles in the organisations approached. The principles of TQM incorporate certain necessary elements that may form part of other managerial techniques. Considering this, even if TQM for itself is not being implemented at a given organisation, a result above zero is easily obtainable. With this in mind, only an organisation with a score above 50 in this study could be said to be implementing TQM. The results obtained from the TQM scores reveal varying levels of TQM implementation, ranging from a top score of 64.10 down to 33.05 out of a maximum of 100 and a minimum of 0. The differences in scores were expected because no two organisations could be implementing the same number of principles at the same level per se. The management philosophy in place is unique for each organisation. This is due to different top management, the managers they employ, the practices they set up, the organisation's philosophy they build - all leading to different quality cultures.

Considering the cut-off point of 50 in calculated scores, only four organisations (B, I, J, E) can be believed to understand the importance of TQM by incorporating it in their management style (Table 7). Company B has a full organisation-wide quality management framework incorporating quality control with feedback systems for employees in place, quality circles, cross-functional training, quality control sheets at

every step of the products development, and top management involvement with quality strategic planning and quality issues, meeting once a month. Company I implements many various quality management systems such as ISO, ITIL, CMMI, and a variation of TQM not surprisingly placing it among the top organisations. Company J also implements numerous quality management entities mainly focused on the theory of ITIL and COBIT. Company E initiated their quality initiative with ISO9001, obtained the certification, and has built onto that. They now perform international benchmarking; continuous improvement on their information systems; setting targets and goals based on customers' needs and expectations (including customer surveys); training/ team building/ skills development; and are managing to develop a quality culture that is consistently pursued by top management.

Four of the ten organisations (A, D, F, G) obtain results in the 30s, which shows less of an interest in TQM and any other quality management initiatives. Company A has had a quality department for the last five years, but it only consists of one individual who does not interact regularly with top management. Company F is the most promising of the four indicating their new involvement in a quality management entity to obtain international recognition – CMMI, and being in the process of forming a quality department. Company D does have a quality assurance department, but serving purely the customer without getting involved with top management or other employees of the organisation – a classic example of misunderstanding TQM. Company G omits TQM blaming the lack of sufficient resources that had to be concentrated on the organisation's rapid expansion involving formation of multiple separate business divisions. They do, however, consider quality initiatives important in the local and global market.

The remaining two organisations (H and C) attain nearly identical TQM scores – 41.69 and 41.66 respectively. Where Company C falls short is the lack of an organisation-wide quality entity. Company C focuses on implementing quality management only in certain departments, e.g. the software factory (this division needs execution of the global best practices because the organisation retails internationally and needs global accreditation). The organisation does have a quality assurance department dealing in issues across all divisions, but does not apply any specific quality management entities. Company H on the other hand has developed its own in-

house quality management standards that are not internationally recognised and shows no interest in obtaining any. A wiser approach might be to incorporate internationally known standards to improve turnover by securing deals (H is obtaining negative results in the two sales indicators).

From the results it is clear that organisations are aware of quality as an issue in the South African and global markets. Awareness alone, though, is not sufficient. To the organisations' credit, they have moved towards quality management finding themselves at various stages of its implementation. Organisations ought to understand that quality is a continuous process and just because an organisation is, e.g. ISO9000, certified, it can still improve operations by adapting other quality management entities such as TQM. ISO is the most common underlying quality entity. This acknowledges Porter and Tanner's (1996, p.6) statement that ISO is one of the most widely used quality frameworks and a useful first step. He also goes on to state that it is not a fully comprehensive business excellence framework (as TQM) and further progress should be planned.

It would be worthwhile to put the study's findings side by side with others regarding the IT industry not only in South Africa but internationally as well. Comparisons could not be made, however, considering that other research regarding TQM and the IT sector could not be found.

Each principle is now discussed one at a time. The descriptive analysis of the data looks at the reasons why so many/few organisations managed to implement a particular principle of TQM. Table 8 shows the results of how many principles are being applied by the investigated organisations.

8.3.1. Attitude and Involvement of Top Management

Leadership and support from top management are found to be the most critical factors. It comes as no surprise for it is known that top management chooses sub-managers and both need to lead by example, create a quality culture, and prepare strategic plans (Yusof, 2000; Powell, 1995; Ahire, 1996). In the light of the findings,

the lack of management commitment is the main weakness found in the investigation. Only three organisations – B, E, and I – are driven by top management with respect to quality. It is certainly no accident that their overall TQM scores correspond with this approach.

Some of the problems identified when visiting the sites and holding interviews may include:

- lack of total commitment to quality by management;
- insufficient time, money, and trained personnel devoted to TQM;
- not enough belief in TQM as an overall management philosophy – organisations feel that they must do it just because others do;
- lack of a clear understanding of TQM by top management;
- lack of belief in employees – changing the way processes are done may be a big change for some employees and management is not patient enough in trying to modify their habits; and
- lack of regular supervision by top management of already set up quality divisions or quality task forces.

8.3.2. Information Systems and Information Technology

Information is the critical enabler of TQM (Ross, 1994, p.61). Information systems can track and improve the quality processes, e.g. by making information available real-time to employees and aiding the transformation of an organisation. Organisations in the IT sector should excel in this division because of the availability of the infrastructure, access to reduced prices, and engaging employees knowledge in information systems design and implementation. The businesses approached, however, generally fail to improve this opportunity considering that only three organisations were found implementing sound information systems.

The interviews' findings point at the main problem - the lack of a complete understanding of benchmarking. The problem lies with two reasons:

1. Once an organisation achieves a relatively high stature in terms of their field, they fail to benchmark internationally because they feel they are one of the

benchmarks in South Africa (SA). Several problems rest with this. Firstly, there are not many South African listed IT organisations competing in exactly the same field. Because of this, listed organisations tend to be the benchmark in SA and the drive to become better, fades. Secondly, without looking internationally, no new ideas can be brought into South African organisations to aid any particular process.

2. Organisations fail to look in other sectors to benchmark a single activity or process, e.g. distribution. From the interviews, it seems that organisations in South Africa do not realise that they can improve certain processes or activities by examining other sectors that specialise in those processes, e.g. marketing division of IT organisation can examine sectors where marketing is constantly used.

8.3.3. Strategic Quality Planning

Strategic planning is needed to plan the long-term implementation of TQM. Quality needs to be integrated into the organisations' visions, goals, policies, and all processes. Only in this way, employees can see the change and take part to create a new quality culture and make TQM more effective.

Only three organisations researched have quality planning in place. Respondents from various levels of the organisation (managerial and non-managerial) completed the questionnaires. Allowing for this, not everybody involved has to be aware of possible quality strategies in place because the organisation may be failing to promote them or may not be initiating them yet. Top managements are responsible for quality planning and thus the lack of their involvement unsurprisingly may result in deficient planning. Of the three organisations with extensive management involvement, two have sound quality planning.

8.3.4. Human Resource Development and Management

It has been researched that one of the best ways to achieve organisational success is by educating, involving, and empowering employees at all levels. TQM emphasises

self-control, autonomy, and creativity among employees and calls for greater active cooperation rather than just compliance. This creates unique inclusive TQM culture.

Five of the ten organisations indicate an implementation of this principle generating a positive sign considering that human resource development is a crucial part in the overall TQM process (Ross, 1994, p. 119, Porter and Tanner, 1996, p.5). It is necessary to mention here that there also are some external factors, e.g. BEE, that stress the importance and necessity of employee development. One of the BEE aims is the development of previously disadvantaged employees by training and educating them. It is possible that some organisations earn higher scores for human resource development due to BEE and not because of a TQM initiative.

8.3.5. Management of Process Quality

Management of quality deals with the execution and maintaining of quality processes that have been planned. This entails management of process quality for work units and suppliers, systematic quality improvement, and quality assessment (see chapter three).

A good number of organisations are implementing the management of quality (six of the possible ten). This is a good sign yet highlights the problem of the lack of strategic quality planning. How can quality be implemented and managed if it is not correctly planned? This is a problem area for the organisations investigated. It seems as if organisations are too eager in trying to start a quality initiative, but fail to plan for it. With a possibility of the quality initiative not developing smoothly in the future, organisations would have no plan or strategies to continue the initiative. This stems from the problem of lack of involvement and commitment from top management.

Quality divisions, if not set up already, need to be developed and regular meetings should be held with top management. If the theory of TQM or any quality management philosophy is unclear to top management, time and effort should be spared to research TQM.

8.3.6. Customer Focus and Satisfaction

This research points to the fact that the customer should be the centre of attention. It is because of them that organisations exist and a TQM initiative is sought after. TQM might streamline processes and cut costs, but should be taken as a sub-factor and not a main factor for initiating implementation of TQM. The main aim of TQM is customer focus and satisfaction to improve business results. The idea of the customer in TQM goes beyond the traditional external customer and includes internal ones, that is, employees dealing with inputs and outputs of internal processes (see chapter three).

It is seen that all the organisations researched except one, take into consideration the customer and customer satisfaction. This is the key to long-term business success and growth – it is positive to see that the organisations recognise this. In interviews held, this topic is widely acknowledged, too. Organisations know that they exist to serve a certain type of customer and focus on providing the best for that customer. Many of the organisations have sound customer focus practices in place with after-sale service considerations. Organisations put forward a great deal of correct steps that improve customer satisfaction - conduct surveys on the product/service offered, offer training for clients, provide solid warranties and guarantees as well as methods that counter any problems in place. The information obtained from customers by the organisations is then used to better the service or product offered by the organisation.

8.3.7. Management Structure and Teams

A certain management structure is required to facilitate the TQM development. Employees should be assigned responsibilities and tasks so that they feel a sense of attachment to their work and the organisation. Included in this is the use of quality councils and quality teams. The aim is to make quality the responsibility of everyone and not just a few managers involved in the head quality department (see chapter three).

Three organisations that were investigated have a management structure with quality teams in place that facilitate the TQM process. This once again shows the lack of

involvement of average employees in the TQM process. A quality department may exist, but fails to incorporate ideas and decisions from employees. This possibility would create/maintain a quality culture that everyone helps develop. This point stems from the lack of human resource development and management and not acquiring the organisations' goals, visions, and missions aligned with the employees'.

8.3.8. Cost of Quality

TQM costs to implement because it takes time; processes need to be restructured; and employees made aware, educated, and trained. These costs are offset by the four costs of non-conformance or the cost of quality (CoQ) – prevention, appraisal, internal failure, and external failure costs. The theory is that in the long-term, TQM introduces savings that overshadow the costs and so should be a worthwhile investment.

This topic of CoQ in the IT sector was argued in the interviews and it is found that it is almost non-existent. The reasons may include that:

- the IT sector deals with projects, goals, and targets unique to the customer that take different times to develop, implement, monitor, and service. Consequently, the organisations cannot measure a CoQ accurately.;
- many organisations find that most of their income comes from maintaining the systems developed. Systems can and indeed are set up on client's premises. In the extreme cases some organisations hire, employ and pay workers to work at the client's site full time. This long-term partnership has both costs and income associated with it that are, apparently, hard to measure in terms of quality.;
- to provide customer satisfaction and secure deals, organisations offer free maintenance for a year, warranty on parts including delivery for a year, etc. They maintain that no CoQ can be calculated on this as customers' premises vary in distance and hence projects take different times to complete. Costs are unique to different projects, different customers, different branches, etc.; and
- upgrades are offered at a discounted rate to existing clients for the retention of the client. The loss in profit on upgrades is not in essence a cost of quality

because it retains the client. Maintenance and warranties on the upgraded parts are also dealt with differently and cannot be measured with respect to CoQ.

Instead of measuring the CoQ, the organisations look at overall costs incurred with respect to returns, maintenance, repairs, etc., and try to minimise them by setting goals. Since they cannot obtain actual CoQ figures, they set goals pertaining to cutting costs, e.g. to reduce returns due to bad installation by 20% by the year X, or cut down implementation time by 10% by the year X.

8.3.9. Conclusion

Overall, only four organisations (B, E, I, and J) are implementing TQM as such. Even if management did not indicate that TQM is their organisation management philosophy, they implement enough TQM principles to achieve a score above 50. A great deal of these principles are present, in various “disguises”, in different quality management practices such as ISO (eight quality management principles), CMMI (derived from TQM ideas), ITIL (derived from principles of TQM), COBIT (four domains of quality), and TQM, which the organisations put into practice (see chapter three). These organisations also feel that the quality initiative is important to business and will continuously maintain its developments.

The most three implemented principles of TQM in order are – customer focus and satisfaction, management of process quality, and human resource development and management. The highlighting point is the positive results in customer focus and human resource development because they involve the two critical areas of an organisation – internal and external customers.

Regarding measuring a CoQ, the goals set by organisations are a more positive approach than not measuring anything at all, as it can still be quantifiable and improvement can be monitored. It can therefore be considered acceptable.

The principles and questionnaires are formulated mostly on international sources. It can be argued that it may not apply to South Africa. Sila (2005) studied the influence

of contextual variables on TQM practices and TQM organisational performance relationships. The country of origin is included as one of the contextual variables and the results show that the implementation of the TQM practices are similar across subgroups of organisations. In addition, the effects of TQM on four performance measures, as well as the associations among these measures, are generally similar across subgroup organisations. Thus the country of origin in implementing TQM does not affect performance relationships**.** This information, combined with the empirical evidence provided by international studies that TQM provides benefits (Iversen, 2002; Agus, 2000; Eriksson, 2003; Hendricks and Singhal, 2001), can educate managers in South Africa by providing another possibility to increase competitiveness. The fact that only four of the ten organisations are implementing TQM indicates the possibility of further development in the IT industry.

8.4. Objective Two

The second objective in the study aims at examining the financial performance of the organisations. Two financial indicators relate to the turnover of the organisation – percentage change in sales and percentage change in return on sales. The latter makes use of operating income as opposed to net income, which is a better measure of performance since it is not greatly affected by accounting methods, tax strategies, or financial structure. Organisations A and G obtain an over 20% overall increase year on year for change in return on sales whilst organisations D, F, and H obtain negative returns.

Organisations F, G, and H are also the lowest performing for both return on assets (ROA) and return on equity (ROE) - two of the financial ratios used. Organisations A and D perform well in both ROE and ROA while organisations B, C, and I perform well in ROA alone. Total asset turnover is the other financial ratio used - organisations A, D, and H fail to make an impression while organisations B, E, G, and J excel.

Percentage change in share price is the last financial indicator used. Share prices of organisations range from 1c to R10 and provide vast differences in the results. Certain

price increases have to be excluded. This is because percentage increases from a low value such as 1c result in high price increases (see chapter six). Organisations A and B show the highest gains in share price over the five-year period.

As expected, the financial indicators chosen and calculated show that each organisation has varying financial results. Some organisations obtain negative results for certain financial indicators while others excel. The main aim of the objective, nevertheless, is to provide information for fulfilling objective three of the study.

8.5. Objective Three

The third, main, objective set out for this study is to establish if there is any association between TQM and financial performance within the investigated organisations. To determine the possibility of an association, the comparisons between two extremes – organisations with the minor and major TQM implementation respectively - were discussed in chapter seven and any noticeable results, highlighted.

A descriptive analysis of the data sways towards the fact that the organisations with higher TQM scores prove better in the financial area, too. The four organisations implementing TQM principles do not perform poorly in any of the financial indicators, but they do not obtain the highest values either. Some organisations that obtain poorer TQM scores reveal unstable financial indicators (performing well in one respect, but poorly in another). All the poor financial indicators results come from organisations implementing only a few or none of the principles of TQM. Nevertheless, they still manage some good results in the financial indicators. The limited scope of the study does not find any significance in either its observations or analyses.

Further examination of the four extreme cases reveals odd results. The two lowest performing organisations, with respect to TQM scores, differ in results in ROE and ROA – organisation G (the lowest performer) obtaining negative figures, organisation D (the second lowest performer) good figures. There is no constant pattern in the

association, which subscribes to the overall analytic result of multiple linear regression and only indirectly hints at advantages of TQM execution. McAdam and McKeown (1999) studied small businesses in Northern Ireland and did not manage to quantify the effects of TQM on bottom line performance either, but managed to show that the organisations benefited by an improvement in processes, people, and supplier and customer relationships overall.

In addition to the extreme cases analyses, multiple linear regression is used to highlight any statistically significant link between TQM and financial performance. Based on the statistical examination in which each financial indicator and the TQM result are involved, the null hypothesis of no association between TQM and financial performance cannot be rejected. The regression results can be seen in Table 10. The R square value of 73% implied that the range of TQM scores accounts for the various financial results. The p values for both the overall regression and the individual variables (financial indicators) are, however, above 0.05 meaning no statistical significance and, consequently, any possibility to confirm a positive link between TQM and financial performance cannot be drawn.

These results go against the writings in the surveyed literature and the findings of past research. These research discussions have been considered throughout the study, and only a brief summary is given here:

- Robinson (Iversen, 2002) developed an index of American organisations selected for their leading quality management methods and managed to show that the overall return on the index was 10% greater than the Standard & Poor's 500 (S&P 500) stock index during the same period.
- Agus (2000) performed a study on Malaysian organisations that empirically investigated the linkages between TQM and financial performance relative to competitors. The paper was successful in providing evidence of the contributing factors of TQM on financial performance.
- Eriksson (2003) performed a similar study in Sweden where quality award winners were examined in comparison to a competitor of similar size not implementing TQM. It found that over the long-term (post implementation of TQM) the award recipients outperformed the non-TQM organisations in

financial performance. Another interesting point was that the indicators used to measure financial performance were similar to the ones used in this research - percentage change in sales, return on assets, return on sales, percentage change in total assets, percentage change in number of employees

- NIST (National Institute of Standards and Technology) examined the organisations that won the Malcolm Baldrige Award and their associated share prices. It was found that the Baldrige portfolio achieved 60% better than the S&P 500. In addition, it made another portfolio of Malcolm Baldrige applicants (not winners) and the applicants outperformed the S&P 500 portfolio by a ratio of 4.5 to 1.
- Hendricks and Singhal (2001) performed a similar study to Eriksson (2003) of winners of quality awards in the USA over a ten-year period. They also used similar financial indicators – percentage change in: growth in assets, growth in sales, share price, operating income. They too found conclusive proof that TQM has a positive effect on financial performance showing that award winners outperformed control groups 38% to 46%.

These studies add to the mounting empirical evidence that TQM can lead to superior growth in sales and earnings, higher profits, higher ROA, and other positive financial results. Results of this study are different. This might be caused by too few organisations being investigated (ten) due to the constraints of the study outlined in chapter one, such as time and the method used. It would be desirable to have larger samples to increase the number of observations for statistical analysis. The research performed by other researchers around the world dealt with many organisations over a longer time frame resulting in statistically significant conclusions.

Another factor that can result in not being able to disprove the hypothesis is the lack of segmentation of the organisations. Of the ten organisations, some are well-established large organisations with widespread interests, whereas the others are substantially smaller, dealing with more of a niche segment in the IT industry. Some of those larger organisations have already initiated a quality movement within their organisations many years ago. As a result, their consequent improvement in the financial figures has already been in place long before the years that are considered

for analysis in this study. In addition, these organisations with a larger market capitalisation cannot have the greatest percentage increases in the financial indicators because these increases occurred before the years of this study, and are now just maintaining an average growth (e.g. the sales of organisation I were a factor of eight times higher in six of the ten organisations studied).

Other reasons for the lack of obtaining a statistically significant association could be due to the:

- method of analysis (TQM) – this could include selecting different weightings between the principles, the inclusion or exclusion of some other principles, or focusing on different areas in each TQM principle. Based on the literature survey done, the most accurate options are thought to have been used, however, after investigating the companies, certain principles could have been excluded (cost of quality) and others included (quality in project management) to possibly provide a better perspective of quality in IT organisations;
- method of analysis (financial performance) – this could take in placing different weightings to the yearly financial figures, assessing different financial performance indicators. Once again, it is thought that the most accurate options have been chosen, still, with base values being different between companies, a more standardised method may be preferred;
- lack of validity – the questionnaire is based on the guidelines for evaluation of applicants for the Malcolm Baldrige National Quality Award and questions used previously in the case studies of Ross (1994) to evaluate organisations. The questionnaire has, though, been created for the purpose of the study and never previously independently validated. Care is taken to enhance validity (Section 6.6.2 on Validity) and reliability (Section 6.6.1 on Reliability). Nonetheless, criterion and construct validity cannot be measured.
- lack of reliability - the lack of the number of overall rating scale questions resulted in groupings of questions in the questionnaire for Cronbach's alpha testing. These groupings are across different TQM principles. If no groupings exist, this may have indicated non-reliable questions.
- The statistical technique used assumed an infinite population. However, that is not true as 40% of the population was sampled. More sophisticated techniques

like hypergeometric analysis may show that some factors are, in fact, significant. Such techniques are beyond the scope of this study.

8.6. Objective Four

The fourth objective, discussing the evolution of TQM as a management philosophy, is dealt with by the case study section of the research. It examines the subject to determine if there are any adaptations to the core viewpoint or expansion of parallel philosophies. Special attention is given to the IT industry that may have a different approach to certain quality issues.

Henderson and McAdam (2004) explain that it is inevitable that internal and external forces will change the current TQM philosophy. They state that it will come from both within the TQM movement as well as externally. Internally, it is likely to include large-scale shifts compared with the present format, which will include redefinition of terminology, especially concerning the use of the word "quality." They believe external influences on change will include environmental issues and socially responsible business practices. The increasing awareness of the need for socially responsible business practices is partially reflected in TQM standards, which are associated with commitment to improvement and employee involvement. The challenge for the TQM of the future is to evolve to be at the forefront of environmental management issues, and be pro-active in setting responsible standards, and ensuring its practices make them achievable.

When some organisations were approached, they denied the use of TQM, but endorsed different quality management philosophies indicating that they are a more modern approach towards quality. The literature survey has proven that new quality management initiatives such as CMMI, Six Sigma, and ITIL have their roots in TQM and endorse similar principles but on a different level. Considering this, the views of certain organisations are considered inaccurate.

There are various internal and external factors that may influence and shape quality management philosophies.

8.6.1. Internal Influences

This section discusses the findings found from interviews pertaining to changes in TQM as a management philosophy, with special attention paid to internal pressures. Management of the more developed organisations (C, F, I, and J) feel there is a shift away from TQM in certain respects to other newer quality management entities. This could imply either additions to the classic TQM philosophy or a more concentrated quality management framework for individual projects and processes.

Newer entities, supposedly addressing modern needs, which came up in the interviews can be incorporated with TQM. Some models and how they link with TQM are summarised here:

- SAEM - diagnostic self-assessment tool – based on Malcolm Baldrige Model and hence TQM.
- IiP – expands on the human resource development and management principle of TQM.
- Six Sigma – deals with continual quality improvement using numerical means (identifying defects). Originated from statistical quality control developed by the pioneers of TQM.

Organisation-wide entities such as TQM can continue to provide overall management best practices. Other entities may be incorporated into the management of the business and increase an organisation's number of entities to compete in a global market. Company I is the most distinct in this respect using SAEM criteria on its processes and making use of six sigma and IiP (Investors in People). The Malcolm Baldrige and other awards still exist and only the criteria required to win the award adapt to modern pressures. The same ideology applies to TQM. It can still provide a competitive advantage to any organisation that undertakes it, it just needs to continually adapt.

Another move away, indicated in the interviews, from TQM, internally, is the development of advanced quality management entities for individual processes,

measurement systems, and improvement methodologies. This can include the planning, implementation, and monitoring of projects for clients. Some of the quality management entities are discussed in chapter three and a full list can be found in Appendix G. The three entities that came up when investigating the organisations are:

- CMMI for control and structure in software (and system) development;
- ITIL for operational and tactical management of service delivery; and
- COBIT as an overall IT governance framework.

It can be understood why this evolution towards more quality management for projects is starting to take place. IT organisations, such as Organisations I and J, undertake IT projects involving months of work and then even years of further monitoring and maintenance (see chapter three – management of process quality). Each client and their project are unique and certain new quality frameworks, for instance ITIL and CMMI, concentrate on the project and provide a checklist. This helps manage the projects making sure that proper attention is given to each aspect of quality throughout the project. It proposes a methodology for projects that is always the same even though the projects differ. This new trend of handling projects can be more specific to the IT industry because unique projects are commonly found in this field. The only principle of TQM that can deal with projects is customer focus and satisfaction and this is not good enough to manage projects or IT service delivery for customers. This is not a reason to disregard TQM, but to rather use it, for the synergistic effect, as the structure for the combination with a new quality management entity that specialises in, and incorporates, a methodology for projects. Jung and Wang (2006) found that TQM alone may have a positive affect on project management.

It can also be understood why there is a need to adopt new best practices to standardise IT processes. New frameworks need to bring consistency and efficiency to the various aspects of IT such as application development, help desk, network operations, security, and service delivery and support. Dubie (2006) explains that ITIL addresses service delivery and support, COBIT covers the broadest spectrum of IT governance, CMMI shows how IT shops rate in terms of maturity compared with best-known processes, and ISO demands intense processes that are focused on quality

and compliance. Organisations need to adopt more than one best-practice framework - or at least parts of many - if they want a complete, effective set of management process guidelines.

IT functions are being asked to add value to the business in a stable, agile and cost effective manner. Many IT functions are turning to industry best practices for guidance on how to improve quality of service while reducing costs, instead of inventing practices and processes themselves (Fry, 2005).

At the moment, ITIL is the international best practice approach, providing comprehensive guidance on how to manage the delivery and support of IT services (Melliar, 2004). Research predicts that there will be widespread adoption of ITIL best practices by internal IT departments (see chapter three) and it is suggested that ITIL will be adopted and used across the world as the standard for best practice in the provision of IT service delivery (Fry, 2005).

In the study, only two of the ten organisations show interest in ITIL – a negative sign for quality management in South Africa if they are to compete with international organisations implementing the most modern quality management practices.

8.6.2. External Influences

Alvin Toffler, an American writer and futurist, is known for discussing the digital revolution and corporate evolution (Wikipedia:Alvin Toffler, 2006). Toffler emphasises that change has become part of life and at an ever-increasing rate. Management theory is no exception to this and has evolved through the years. This evolution comes as a result of changes in the environment (Smit, 1999, p.57). TQM is developed to be a complete organisational management tool making sure to incorporate all elements of an organisation. TQM looks at continuous improvement and never being satisfied with quality i.e. focusing to improve internal processes. This is still necessary and certain elements of TQM are still relevant, if not almost all of them. The difference lies in the fact that both the organisation and the classic TQM

model should take into account external factors, too. These external factors can be economical, political, social, or environmental.

South Africa has been undergoing organisation restructuring in many areas. Over the last decade, corporate sustainability has steadily broadened from an initial focus on philanthropy and environmental management towards including health, safety, labour, community and broader socio-economic issues (KPMG, 2004). Corporate governance and the pressure of complying with empowerment and transformation codes are firmly entrenched as the new business necessity (Candy, June 2005). Corporate governance acknowledges that there is a move away from the single bottom line (that is, profit for shareholders) to a triple bottom line, which embraces the economic, environmental and social aspects of an organisation's activities. TQM needs to adapt to take into consideration external influences such as the corporate governance and ethics, sustainability issues, and black economic empowerment (BEE) criteria, all of which are necessary for long-term continuance and prosperity in South Africa. It is for this reason that TQM needs to combine with other management issues to remain a holistic approach. When discussing corporate governance in the interviews, the organisations had more of a classic view regarding TQM and external influences - that they are not intertwining. Both are acknowledged as important, just not seen as symbiotic. The major objectives of an organisation are now not only creating shareholder's wealth by improving profits, ensuring adequate liquidity, and improving growth, but serving society by enriching the lives of employees (TQM incorporates some of this), serving the various communities, and conserving the environment for future generations.

This is evident in the companies analysed. Focus is being deterred by trying to improve BEE and corporate governance so that future projects are secured. With current positive economic conditions place (low interest rates spurring improved GDP growth encouraging development in cyclical sectors such as IT and a relatively stable exchange rate), it is not as necessary to concentrate on redefining IT organisations with regard to their management processes. Initiatives such as BEE, corporate governance, and proudly SA are evident in many of the companies studied. These external influences are required to get try projects in lucrative markets such as government spending and NEPAD (Appendix A). Management themselves indicate

focus is being diverted from a TQM framework to these initiatives (companies G, H, I). This is in no way incorrect, external influences need to be managed for future sustainability. These external influences are currently evolving management theory.

The central focus of TQM was, is, and still will be customer satisfaction. The new developments, however, need to be incorporated into the TQM philosophy. Henderson and McAdam (2004) declare that there is no shortage of views on the present state and usage of TQM tools and philosophy, and how they impact on organisations. The fact that so many take the time and effort to contribute to the debate about how to define TQM, how to use it, adopt it, adapt it, promote it, and develop it is a tribute to its recognition as an important factor in ensuring that an organisation maintains its focus on customers' needs and expectation, and how to maintain the consistency of that focus. They believe TQM continues to play a central role in future organisational development. The changes to TQM will build on the existing academic and organisational reputation of TQM to meet the demands of external organisational change.

Questions concerning external influences that were raised in the interviews did not meet with any noteworthy answers. Representatives agreed that these pressing issues are important in the long-term prosperity of the organisation and have to be incorporated into management. Of all the external factors discussed, BEE and corporate governance were mostly stressed. Organisations should take a closer look at the TQM philosophy in general, how it is to be used in their environment, and how it can use TQM ideas to forge new management theories. Changing dynamics of the marketplace require that old mind-sets of the organisation-wide TQM approach shift directions to include external influences.

8.6.3. Overall Model

The quality revolution started in Japan in 1946 with Deming and spread to the United States in the 1980s. The TQM movement peaked between 1992 and 1996. Gibson and Tesone (2001) reveal that although the TQM trend has declined since then, it is still alive. The philosophy of continuous quality improvement now might carry a different

name in organisations, but with the same underlying principles. Flynn (2005) acknowledges this by stating that TQM has become integrated into good, mainstream management practice because it contains valuable core ideas. Furthermore, it is doubtful that any organisation will be able to ignore the necessity of improving customer service and the quality of goods and services.

In the same way that the Malcolm Baldrige Award undergoes annual revision of core values and concepts, scoring guidelines, and weightings, TQM should continually adapt to external and internal influences to reflect current thinking. Mehra et al (2001) tried identifying the future role of TQM in businesses facing global markets. They found that organisations need to take a closer look at the TQM philosophy in general and, specifically, how it is to be used in their environment. Furthermore, businesses should undertake a challenge to design operations using seamless boundaries in internal processes and external transactions. Their research found that instantaneous response to changing market dynamics would be the single most important challenge of the future. It requires a new definition of quality and TQM alike. The same as every business, even South African organisations, being a part of the international market place, should heed the advice to improve their competitive edge. Parajogo and Sohal (2004) presented a case study of an organisation that has been successfully maintaining its competitive advantage and growth. Based on the analysis of the research findings they suggest that organisations need to keep vigilant in observing the changes occurring in the business environment adjusting their strategy accordingly, and that it is highly important to redefine and broaden the application of the principles of TQM understanding the need to tailor them appropriately. These two findings concur with the result of this study. TQM needs to incorporate specific South African external influences and adapt, in general, to include internal influences such as project handling.

To make the adaptation easier and more effective, TQM can link with other known best practices to cover aspects that face local and global organisations and form a new integrated management system. CMMI can be used to guide process improvement across a project and provide the latest best practices for product and service development and maintenance. The origins of CMMI lie with TQM, so the core characteristics are the same, but rather applied in a more modular fashion for easier

implementation over projects. ITIL, on the other hand, contains comprehensive, publicly accessible specialist documentation on the planning, provision, and support of IT services and also covers the environmental facilities needed to support IT. The combinations of various entities are able to cover the processes and operations (external and internal influences) within an organisation remaining a holistic approach for continuous quality. Figure 24 shows how an overall management system incorporating the needed entities can be formulated. Stoller (2005) states that organisations need to turn to other frameworks to fill the gaps that other entities cannot fill.

Dubie (2006) studied various organisations and analysed the implementation of various IT best practices. It was found that organisations suggest that in many cases, ITIL, COBIT, and CMMI should be adopted together depending what they wanted out of the various entities. Advice, in the form of three steps, is given on how managers should approach process adoption: start with a framework such as COBIT or ITIL; move on to a standard that can be certified, such as the many ISO guidelines; then perform ongoing improvements that can be measured by, for example, CMMI or Six Sigma. This is similar to the view found in this research through Organisations I and J when discussing the need to combine the mentioned philosophies. In Figure 24, TQM formulates the core with necessary principles and deals with aspects such as the "soft" dimensions of leadership and human resource management; CMMI is an off-shoot of TQM dealing with projects, products, processes, and increasing maturation levels of the other best standards; COBIT brings in check points and security points; external factors such as BEE and corporate governance, are taken into consideration; and underlying all are necessary best practices to improve any one process or principle in TQM. ITIL would run the day-to-day operations of IT whilst Six Sigma is an ideal discipline and set of skills to implement COBIT and ITIL (Fry, 2005). It is thought that this is a commanding combination since many of the current best practices are derived from the principles of TQM and similar ideologies underline their structure. In any case, an array of frameworks, tailored to the particular needs of the organisation is the best approach. South African organisations' awareness of these various best practices is minimal. Managers should realise the potential of structuring and improving processes within an organisation to compete with international organisations.

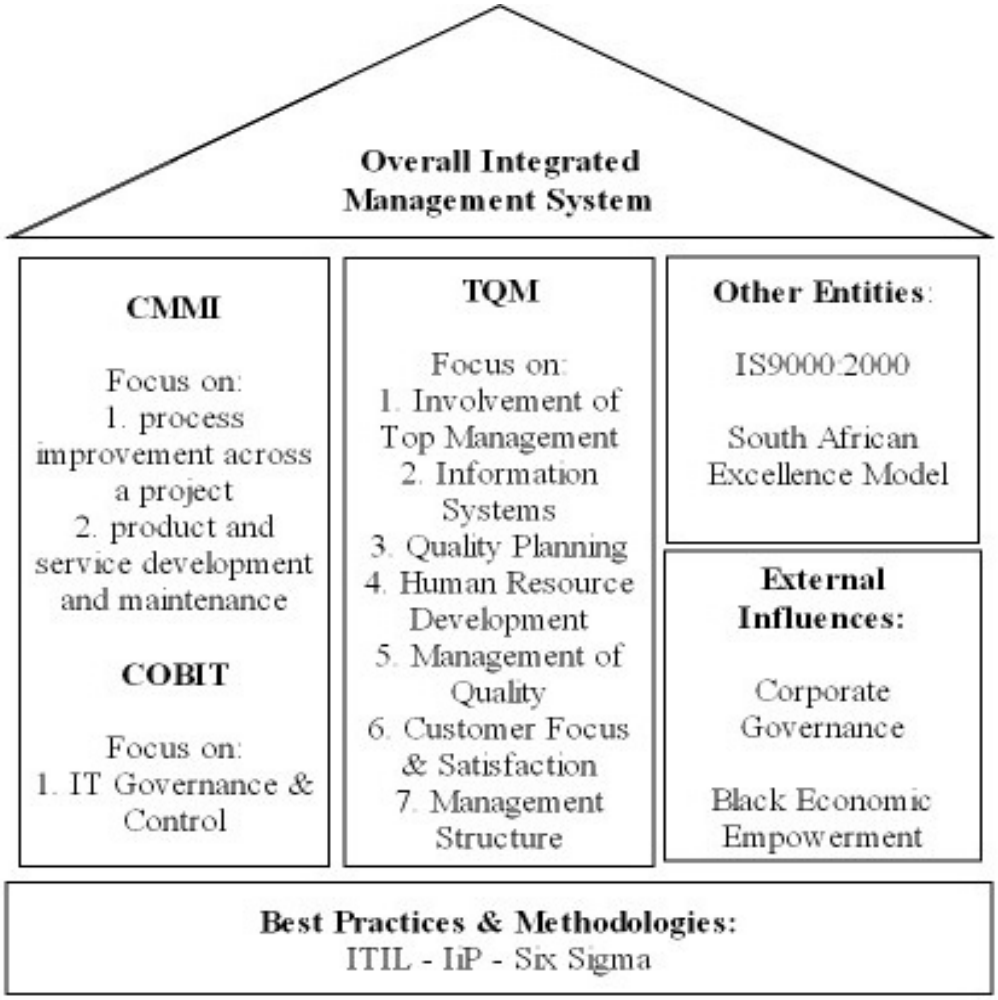

Figure 24: Integrated Management System with All Entities

Chapter Nine: Conclusion and Directions for Future Research

9.1. Conclusion

Quality management is a complex topic. Regular evaluation studies carried out among concerned parties at performing levels provide a valuable method to help us understand how employees feel about and understand quality and how it can be improved. By the questionnaires' analysis it has been illustrated that the studied organisations benefit from varying, and insufficient, for that matter, levels of TQM implementation. Only four of the ten organisations prove to be applying at least some of the eight core principles of TQM. This differs from the standards set at the international level by leading enterprises. The main problem areas such as improper quality planning and insufficient quality managerial structures seem to stem from the lack of commitment and involvement of top management. If quality management is to be taken forward, successfully, with all organisations and their employees being asked to make an active contribution to future organisational development, then the satisfaction, attitudes, and concerns of personnel expressed in the questionnaires, should be acknowledged and the relevant executives put the theory into practice. It would appear that the potential benefits of proper quality management are not clear to decision-making bodies. Although unpopular, the only answer to the predicament would seem to be the only appropriate measure of the relevant Board of Directors, themselves educated in quality issues, to improve the shape of the organisation.

Based on international findings, a positive link between TQM and financial performance was expected. A descriptive analysis of the data does indicate that the organisations with higher TQM scores prove better in the financial area, too. On contrast, the financial results of the organisations, not putting quality principles in to practice are not as stable. Statistical testing does not provide any further evidence for an association between TQM and financial performance.

While TQM principles are found, to a large extent, insufficient in occurrence, certain organisations scored relatively highly in dealing with internal influences (process management), external influences (corporate governance and economic

empowerment), and quality issues through different means. Alternative, modern, more processed based quality management philosophies (namely ITIL, COBIT, and CMMI) are in place, although even higher levels would be desirable – only five organisations seek other quality entities. The supervisory structures should only be commended for that. It suggests that they are well informed on the quality issues that are under scrutiny in the modern-day business environment trying to extrapolate them into the South African environment. The emerging new philosophies and their good rapport with the business management put even the usability of TQM in isolation into question. It has been a further proof that although the traditional ideology behind TQM remains in place, it needs to adjust to the contemporary corporate world.

9.2. Implications of the Study

This work remains the only cross-sectional study considering issues surrounding problems with TQM implementation in the IT industry in South Africa.

Smit suggests that today's business environment is more turbulent than ever. South African organisations are particularly hard pressed because of South Africa's relatively recent entry into the global economy. The organisations now have to compete in a borderless world against established competitors such as the United States of America and Singapore (Smit, 1999, p.139). There might be different views on how to improve the business' competitiveness (e.g., through better salaries, productivity, skills development, cooperation with unions, etc.), but elaboration on that is out of the scope of this study. TQM, though, while certainly not a universal remedy, is one management philosophy that is capable of aiding South African organisations. The performance of TQM is more mature in international organisations as it has become integrated into mainstream management practice (Gibson and Tesone 2001; Flynn, 2005). More and more organisations can focus on quality management entities to increase competitiveness by implementing internationally accepted best practices. This may also improve expansion opportunities both locally and globally.

Unlike purely mass product-oriented industrial fields (e.g., car industry) where the necessity for standard TQM is unquestionable, the service-oriented specifics of the IT industry have put the usability of TQM in isolation into question. The lack of TQM in the IT sector found in this research highlights this.

It is true that the study does not find any definite positive association between quality and financial performance, but the results are nonetheless indicative of the overall appeal of the correct quality management of any variety. Learning from the findings of this study and mistakes of the organisations' initial executions, and better reciprocal understanding of all contributors involved should ensure that quality and, ultimately, customer satisfaction, could improve considerably over time.

9.3. Further Research

Every research has limitations and it is important to recognise these explicitly. It would be desirable to have larger samples to increase the number of observations for statistical analysis and to increase the general, overall results. In the same thought, these findings should be validated by using other samples. However, one of the consequences of a cross-sectional research design is the lack of information over time and examining exactly when any TQM principles started to take shape at selected organisations. This research also places reliance upon a single respondent in each organisation. In future research, it may be advantageous to use multiple respondents in each organisation to improve respondent reliability. Future researchers can also examine the methodology used in this study (questionnaires and interviews) and may opt for other strategies. Other studies make the use of quality award winners (Hendricks and Singhal, 2001; Eriksson, 2003) compared to a competitor of similar size not implementing TQM.

The validity and reliability of the TQM questionnaires are high, but still subject to improvement. Further empirical research may be conducted on redefining the TQM elements by a more refined method. This could include selecting different weightings between the principles, the inclusion or exclusion of some other principles, or focusing on different areas in each TQM principle. More questionnaires per

organisation may also provide a better representation of TQM principles at the organisations. The financial success is measured on six chosen indicators. These may be refined and others may be included, more aimed at TQM such as percentage change in number of employees. Also, different emphasis may be placed on the weightings of each year's financial figures.

Future research work may incorporate other selected quality management entities being implemented in South Africa and how they affect financial performance on a broader spectrum. More focus may also be given to local trends and external influences and determine the affects on management and the bottom line. Evolution of TQM and other quality management frameworks can also be examined in other industries to compare the findings to, e.g. project management, and provide even more concrete information for the management of South Africa.

Both ongoing monitoring and intermittent evaluations of TQM are needed and could form the foundations for further research. Systemic incorporation of other quality management entities, extra focus on local trends, and exploration of other industrial fields, can assist in giving details about the South African position.

References

Agus, A. and Krishnan, S. K. and Kadir, S. L. S. A. The structural impact of total quality management on financial performance relative to competitors through customer satisfaction: A study of Malaysian manufacturing organisations, *Total Quality Management Journal*, Abingdon, July 2000, Volume 11, Issues 4-6, pp. S808-S820

Ahire, S. L. and Golhar, D. Y. and Waller, M. A. Development and validation of TQM implementation constructs, *Decision Sciences Journal*, 1996, Volume 27, pp. 23-56

Alexander, M. *Black Economic Empowerment*, South Africa Info RePorter and Tanner, South Africa Business Guidebook 2002-2003, Towards a Ten Year Review, http://www.southafrica.info/doing_business/trends/empowerment/bee.htm, 2003

Anderson, B. *Down but not out*, Moneyweb Holdings Limited, http://www.moneyweb.co.za/shares/ict_sector/383958.htm, 2 September 2004

Balachandran, S. *Customer-Driven Services Management*, Second Edition, Response Books, Thousand Oaks, California, 2004

Bankseta, *Investors In People*, http://www.bankseta.org.za/investors_in_people/default.asp, 2005

Berry, L. L. and Bennett, D. R. and Brown, C. W. *Service Quality, A profit strategy for Financial Institutions*, Richard D Irwin Inc, Homewood, Illinois, 1989

Bicheno, J. *34 for Quality, A guide to 8 Gurus, 7 Tools, 7 Wastes, 12 Techniques*, Picsie Books, Buckingham, 1991

Brealey, R. A. and Myers, S. C. *Principles of Corporate Finance*, Fourth Edition, McGraw-Hill Inc, New York, 1991

Buzzell, R. D. and Gale, B. T. *The PIMS* Principles, Linking Strategy to Performance, *Profit Impact of Market Strategy*, The Free Press, New York, 1987

Camp, R. C. *Benchmarking, The search for industry best practices that lead to superior performance*, ASQC Quality Press, Milwaukee, Wisconsin, 1989

Candy, G. *E-Government on the Way*, Moneyweb Holdings Limited, http://www.moneyweb.co.za/shares/ict_sector/420154.htm, 1 March 2005

Candy, G. *Awarding Good Governance*, Moneyweb Holdings Limited, http://www.moneyweb.co.za/specials/corp_gov/454163.htm, 23 June 2005

Carnegie Mellon, *What is CMMI?*, Carnegie Mellon University, http://www.sei.cmu.edu/cmmi/general/general.html, July 2005

Carnegie Mellon, *Capability Maturity Model (CMM) and CMM Integration (CMMI)*, Carnegie Mellon University, http://www.cs.hmc.edu/courses/2005/spring/cs121/slides/cmm.pdf, 2005

Coetzee, H. *Interview Held – Pinnacle Group Financial Manager*, Pinnacle Limited, (011) 265 3216, hano@pinnacle.co.za, 6 October 2005

Cortada, J. W. *TQM for information systems management: quality practices for continuous improvement*. McGraw-Hill, New York, 2005

Costa, M. M. and Lorente, A. R. M. ISO 9000 as a tool for TQM: A Spanish Case Study, *The Quality Management Journal*, Milwaukee, 2004, Volume 11, Issue 4, pp.20-31

Crosby, P. B. *Quality is Free: the art of making quality certain*, New York: New American Library, 1979

Crosby, P. B. *Quality Without Tears, The Art of Hassle-Free Management*, McGraw Hill, New York, 1984

Definition:Financial Performance, *Dictionary – Financial Performance*, Dictionary.com, http://dictionary.reference.com/browse/financial%20performance, Accessed 16 June 2006

Dekker, C. *King Report on Corporate Governance 2002 – What it means to you*, Cliffe Dekker, http://www.cliffedekker.co.za/literature/corpgov/, Accessed 13 March 2006

Deming, W. E. *Quality, Productivity and Competitive Position*, Massachusetts Institute of Technology, Centre for Advanced Engineering Study, Cambridge, Massachusetts, 1982

Dictionary, *Share Price – What's the definition*, Investor Dictionary.com, http://www.investordictionary.com/definition/share+price.aspx, Accessed 20 February 2006

Drummond, H. *The Quality Movement, What Total Quality Management is Really All About*, Nichols Publishing, London, 1992

Dubie, D. ITIL Best Practices gain growing interest: survey, *Network World*, Framingham, November 2004, Volume. 21, Issue 46, p.19

Dubie, D. Better management through best practices, *Network World*, Framingham, January 2006, Volume 23, Issue 2, p. 28

Dye, R. W. The world of work in 2010, *CMA Management*, Hamilton, December 2001/January 2002, Volume 75, Issue 9, pp. 38-42

Easton, G.S. and Jarrell, S.L. The effects of total quality management on corporate performance: an empirical investigation, *Journal of Business*, Volume 71, No 2, 1998 pp. 253-307.

Elmuti, D. and AlDiab, T. F. Improving Quality and Organisational effectiveness go hand in hand through Deming's Management System, Gibson D. Lewis Centre for Business and Economic Development, http://coba.shsu.edu/jbs/vol12/no1/12-1-6.htm, *Journal of Business Strategies*, Spring 1995, Volume 12, Number 1, pp. 86-98

Emerick, N. *South Africa's leap from information dirt road to super highway*, The Free Market Foundation of Southern Africa, http://www.freemarketfoundation.com/ShowArticle.asp?ArticleType=Issue&ArticleId=1815, 7 September 2004

Eriksson, H. and Hansson, J. The impact of TQM on financial performance, *Measuring Business Excellence Journal*, Bradford, 2003, Volume 7, Issue 1, pp.36-51

FED. *About the FED*, Federal Reserve Bank of San Francisco, http://www.frbsf.org/publications/federalreserve/monetary/affect.html, 2005

Feigenbaum, A. V. *Total Quality Control*, Third Edition, McGraw Hill, New York, 1983

Feigenbaum, A. V. *Quality and Productivity*, Quality Progress, 1977

Feinberg, P. *Corporate Financial Management and Decision Making*, 2nd Edition, Peter Feinberg Business Planning cc, Johannesburg, 2005

Firer, C. and Ross, S. A. and Westerfield, R. W. and Jordan, B. D. *Fundamentals of Corporate Finance*, 3rd South African Edition, McGraw Hill, London, 2004

Flynn, B. B. Introduction, *The Total Quality Management Journal*, Milwaukee, 2005, Volume 12, Issue 2, p. 4

Fry, M. *TQM, ISO, COBIT, ITIL: Putting the Frameworks Together to Improve Business*. IT Business Edge, http://www.itbusinessedge.com/item/?ci=2623, February 2005

Fry, M. The hidden pitfalls of ITIL, *Network Times* – IT Magazine for IT decision makers, Paradigma Publishing, http://networktimes.co.za/article.asp?pklArticleId=3619&pklIssueId=537&pklCategoryId=295, August 2005

Gardner, B. R. ISO 9000 and TQM: Is it OK to Choose?, *Community Quality Journal*, September/October Edition, http://deming.eng.clemson.edu/pub/tqmbbs/iso9000/isovstqm.txt, Accessed 12 December 2005

Garson, G. D. *PA765 – Multivariate Analysis in Public Administration*, Professor of Public Administration, College of Humanities and Social Sciences, http://www2.chass.ncsu.edu/garson/pa765/index.htm, Accessed 25 May 2005

Gibson, J. W. and Tesone, D. V. Management fads: Emergence, evolution, and implications for managers, *The Academy of Management Executive*, Briarcliff Manor, November 2001, Volume 15, Issue 4, pp. 122-134

Goodspeed, I. *The Equity Market*, South African Institute of Financial Markets (SAIFM), Johannesburg, Registered Persons Exam Module, January 2004

GraphPad. *GraphPad Software*, http://www.graphpad.com/instat/instat.htm, 2005

Gruska, G. F. W.E. Deming in the new millennium, *Total Quality Management*, Abingdon, July 2000, Volume 11, Issues 4-6, pp. S779-S788

Harrington, H. J. *Business Process Improvement, The breakthrough strategy for total quality, productivity, and competitiveness*, American Society for Quality Control, McGraw Hill, New York, 1991

Henderson, J. and McAdam, R. Will we recognize the TQM of the future? Factors which will reshape the body of knowledge, *Measuring Business Excellence*, Bradford, 2004, Volume 8, Issue 4, pp. 76-80

I-Net. *Rand Stable despite choppy market waters*. Business Report, http://www.busrep.co.za/index.php?fSectionId=564&fArticleId=3036867, December 15 2005

Investopedia, *Moving Average – MA*, Investopedia Inc. 2000, http://www.answers.com/moving+average&r=67, Accessed 20 February 2006

ISO, International Organisation for Standardisation, *ISO 9000 in brief*, http://www.iso.org/iso/en/iso9000-14000/understand/inbrief.html, Accessed 14 June 2006

ITIL, *Achieving IT Service Leadership*, itil.org, http://www.itil.org/itil_e/index_e.html, 2005

Iversen, W. Bottom-Line Quality, *Quality*, Troy, August 2002, Volume 41, Issue 8, p.6

Jarrar, Y. F. and Zairi, M. Best practice transfer for future competitiveness: A study of best practices, *Total Quality Management*, Abingdon, July 2000, Volume 11, Issue 4-6, pp. S734-S781

Jacob, S**.** The IT best practices revolution, *Network World*, Aug/Sep 2005, Volume 79, Issue 5, pp.46-47

Jeffries, D. R. and Evans, B. and Reynolds, P. *Training for Total Quality Management*, Practical Trainer Series, Kogan Page, London, 1992

Juhl, H. J. and Kristensen, K. and Kanji, G. K. and Batley, T. W. Quality Management: A comparison of cultural differences, *Total Quality Management*, Abingdon, January 2000, Volume 11, Issue 1, pp. 57-66

Jung, J. Y. and Wang, Y. J. Relationship between total quality management (TQM) and continuous improvement of international project management (CIIPM),

Technovation, Science Direct, Volume 26, Issues 5-6, May-June 2006, pp. 716-722

Juran, J. M. Made in USA-A Quality Resurgence, *Journal for Quality and Participation*, March 1991, pp.6-8

Juran, J. M. *Juran on Quality by Design, The New Steps for Planning Quality into Goods and Services*, The Free Press, New York, 1992

Kaplan, I. *Telephone Conversation about IT Sector*, Kaplan Equity Analysts, http://www.kaplanequity.com/, 7 October 2005

Kanji, G. K. and Wallace, W. Business excellence through customer satisfaction, *Total Quality Management*, Abingdon, Volume 11, Issue 7, pp. S979 – S999, September 2000

Kathleen, C. Baldrige beefs up on finance, *CFO*, Boston, March 1995, Volume 11, Issue 3, p.18

KPMG. *2004 KPMG Survey on Integrated Sustainability Reporting in South Africa – A Ten Year Review*, KPMG, http://www.waynevisser.com/cc_in_sa_short.htm, December 2004

Kruger, W. *Interview Held – Mustek Credit Manager*, Mustek Limited, (011) 237 1000, WalterK@jhb.mustek.co.za, 6 October 2005

Lapin, L. L. *Statistics for Modern Business Decisions*, Third Edition, Harcourt Brace Jovanovich Inc, New York,1982

Lawler III, E. E. and Mohrman, S. A. and Ledford Jr, G. E. *Employee Involvement and Total Quality Management, Practices and Results in Fortune 1000 Companies*, Jossey-Bass Publishers, San Francisco, 1992

Lawler II, E. E. and Mohrman, S. A. and Ledford Jr, G. E. Do employee involvement and TQM programs work?, *The Journal for Quality and Participation*, Cincinnati, Jan/Feb 1996, Volume 19, Issue 1, pp.6-111

Lee, C. C. and Lee, T. S. and Chang, C. Quality/productivity practices and organisation performance in China, *The International Journal of Quality and Reliability Management*, Bradford, Volume 18, Issue 6/7, pp. 604-625, 2001

Leedy, P. D. *Practical Research, Planning and Design*, Third Edition, Macmillan, New York, 1980

Lemak, D. J. and Reed, R. Commitment to total quality management: is there a relationship with firm performance, *Journal of Quality Management*, 1997, Vol. 2 No. 1, pp. 67-86

Linde, K. V. and Horney, N. and Koonce, R. Seven ways to make your training department one of the best, *Training and Development*, Alexandria, August 1997, Volume 51, Issue 8, pp.20-26

Malhotra, N. K. *Marketing Research, An Applied Orientation*, Prentice-Hall International Editions Inc, New Jersey, 1993

Malhotra, N. K. *Marketing Research, An Applied Orientation*, Third Edition, Prentice-Hall Inc, New Jersey, 1999

McAdam, R. and McKeown, M. Life after ISO9000: An analysis of the impact of ISO9000 and total quality management on small businesses in Northern Ireland, *Total Quality Management*, Abingdon, March 1999, Volume 10, Issue 2, pp.229-242

McConnell and Brue, *Economic Growth and Instability*, Chapter 8, http://www.wits.ac.za/sebs/downloads/2005/econ109.macro.mcconnell_ch8.ppt, 2005

McLeod, D. *BEE's Ups and Downs*, Top Empowerment Companies 2005, Financial Mail, http://free.financialmail.co.za/projects05/topempowerment/stories/lbee.htm, 4 March 2005

Mehra, S. and Hoffman, J. M. and Sirias, D. TQM as a management strategy for the next millennia, *International Journal of Operations and Production Management*, Bradford, 2001, Volume 21, Issue 5/6, pp. 855-877

Melliar, F. *IT Service Management Best Practice, Frameworks, Standards, and Models*, Thought Leadership Piece, http://www.foster-melliar.co.za/whitepapers/Thought%20Leadership%201.pdf, 2004

Monteiro, A. *SA Lapping up PCs and Notebooks*, Moneyweb Holdings Limited, http://www.moneyweb.co.za/shares/ict_sector/464072.htm, 21 July 2005

Nau, R. F. *Testing the assumptions of linear regression*, Associate Professor, Ph.D. University of California, Berkeley, http://www.duke.edu/~rnau/testing.htm, Accessed 20 April 2006

NIST. *Quality Management Proves to be a Sound Investment*, National Institute of Standards and Technology, http://www.nist.gov/public_affairs/releases/n95-05.htm, 3 February 1995

Nthite, C. *Interest Rates to Inch Up?*, Moneyweb Holdings Limited, http://www.moneyweb.co.za/economy/economic_trends/488706.htm, 19 September 2005

Nunnally, J. C. *Psychometric Theory*, Second Edition, McGraw Hill, New York, 1978

Obert, T. *An Exploratory Study of the Link Between Strategic Types and Quality Management*, http://coba.shsu.edu/jbs/vol13/no1/13-1-5.htm, 1996

OGC, *ITIL: IT Service Management*, Office of Government Commerce (OGC), http://www.itil.co.uk/, 2005

Ozeki, K. and Asaka, T. *Handbook of Quality Tools, The Japanese Approach*, Productivity Press, Cambridge, Massachusetts, 1990

Parajogo, D. I. and Sohal, A. S. Transitioning from total quality management to total innovative management: An Australian case, *The International Journal of Quality & Reliability Management*, Bradford, 2004, Volume 21, Issue 8, pg. 861

Parzinger, M. J. and Nath, R. A study of the relationships between total quality management implementation factors and software quality, *Total Quality Management*, Abingdon, May 2000, Volume 11, Issue 3, pp.353-372

Porter and Tanner, L. and Tanner, S. *Assessing Business Excellence*, Oxford, 1996

Powell, T. C. Total quality management as competitive advantage: a review and empirical study, *Strategic Management Journal*, 1995, Volume 16, pp. 15-37.

Praxiom, *ISO 9000 – An Introduction*, Praxiom Research Group Limited, http://praxiom.com/iso-intro.htm, August 25 2005

ProudlySA. *What is…Proudly South African*, http://www.proudlysa.co.za, 2005

Przasnyski, Z. H. and Tai, L. S. Stock Market reaction to Malcolm Baldrige Quality Award announcements: Does quality pay?, *Total Quality Management*, Abingdon, May 1999, Volume 10, Issue 3, pp.391-401

Pyzdek, T. *Why Six Sigma is not TQM*, http://www.pyzdek.com/six_sigma_vs_tqm.htm, February 2001

Ray, C. The seven Cs of effective supplier evaluation, *Purchasing and Supply Management*, Easton-on-the-Hill, April 1995, pp.44-45

Reh, F. J. *About – Management – Benchmarking*. About Inc. New York Times Company, http://management.about.com/cs/benchmarking/a/Benchmarking.htm, Accessed 23 July 2005

Reimann, C. W. Winning Strategies for Quality Improvement, *Business America*, March 25, 1991, pp. 8-11

Ross, S. A. and Westerfield, R. W. and Jordan, B. D. *Fundamentals of Corporate Finance*, Third Edition, Richard D Irwin Inc, Chicago, 1995.

Ross, J. E. *Total Quality Management, Text, Cases and Readings*, Second Edition, St Lucie Press, Florida, 1994

Roubini, N. *Gross Domestic Product*, http://pages.stern.nyu.edu/~nroubini/bci/GDP.html, 2004

SABS, *South African Bureau of Standards*, Electro-technical/Service http://www.sabs.co.za/index.aspx, Accessed 14 June 2006

SAEF, *About SAEF*, South African Excellence Foundation, http://www.saef.co.za/asp/about/#saem, 2005

SARB, *South African Reserve Bank – Interest Rates*, http://www.reservebank.co.za/, Accessed 14 April 2006

Seria, N. *Economists expect no change in Interest Rates*, Business Report, http://www.busrep.co.za/index.php?fArticleId=3026571&fSectionId=606&fSetId=662, December 8 2005

Sila, I. The Influence of Contextual Variables on TQM Practices and TQM-Organizational Performance Relationships, *The Business Review*, Cambridge, Hollywood, Summer 2005, Volume 4, Issue 1, pp. 204-210

Singhal, V. R. and Hendricks, K. B. The Long-Run Stock Price Performance of Firms with Effective TQM Programs, *Management Science*, Volume 47, No 3, March 2001 pp.359-368

Singhal, V. R. and Hendricks, K. B. Does Implementing an Effective TQM Program Actually Improve Operating Performance? Empirical Evidence from Firms That Have Won Quality Awards, *Management Science*, Volume 43, No 9, September 1997 pp. 1258-1274

Singhal, V. R. and Hendricks, K. B. Don't count TQM out, *Quality Progress*, Milwaukee, April 1999, Volume 32, Issue 4, pp.35-43

Singhal, V. R. and Hendricks, K. B. Firm characteristics, total quality management, and financial performance, *Journal of Operations Management*, 2001, Volume 19, pp. 269-285

Smit, P. J. and Cronje, G. D. J. *Management Principles*, A contemporary Edition for Africa, 2nd Edition, Juta & Co Ltd, Kenwyn, 1999

Stat-A-Matrix, *Six Sigma/TQM*, SAM Stat-A-Matrix Frequently Asked Questions, http://www2.statamatrix.com/sub1_six.cfm?n2=faq, Accessed 12 December 2005

StatsDirect, *Statistical Software*, http://www.statsdirect.com/, StatsDirect Ltd., 2005

StatsSA. *Latest Key Indicators - GDP*, Statistics South Africa http://www.statssa.gov.za/keyindicators/keyindicators.asp, Accessed 20 March 2006

StatSoft, *Multiple Regression*, StatSoft Inc. http://www.statsoft.com/textbook/stmulreg.html, 2003

Stoller J. The IT Best Practices Revolution, CMA Management, http://www.managementmag.com/index.cfm/ci_id/2364/la_id/1.htm, Accessed March 2006

Stoner, J. A. F. and Werner, F. M. *Managing Finance for Quality, Bottom-Line Results from Top-Level Commitment*, ASQC Quality Press, Milwaukee, Wisconsin, 1994

Stones, L. *ICT Set for Growth – Mustek*, Business Day, JSE SENS, http://jsefin.hosted.inet.co.za/news/story/1939801, 5 September 2005

Sullivan, B. *Subject: Stocks – Cyclical*, The Investment – FAQ, http://invest-faq.com/articles/stock-cyclicals.html, 1995

Tredway, G. *BEE Deals in IT*, Moneyweb Holdings Limited, http://www.moneyweb.co.za/shares/ict_sector/378252.htm, 3 December 2003

Who Owns Whom, *Mustek*, Who Owns Whom Pty (Ltd), http://www.africanstatistics.co.za/organisationprofile/870.html, 2003

Wiener, E. *Umbrella keeps Sanlam dry*, Moneyweb Holdings Limited, http://www.moneyweb.co.za/shares/financial_services/379949.htm, 4 March 2004

Wikipedia:Alvin Toffler, *Alvin Toffler*, Wikipedia – the free encyclopaedia, http://en.wikipedia.org/wiki/Alvin_Toffler, Accessed 22 February 2006

Wikipedia:COBIT, *COBIT*, Wikipedia – the free encyclopaedia, http://en.wikipedia.org/wiki/COBIT, Accessed 4 May 2006

Wikipedia:Dot-Com, *Dot-Com*, Wikipedia – the free encyclopaedia, http://en.wikipedia.org/wiki/Dot-com, Accessed 20 February 2006

Wikipedia:Inflation, *Inflation*, Wikipedia – the free encyclopaedia, http://en.wikipedia.org/wiki/Inflation, Accessed 20 March 2006

Wikipedia:NEPAD, *NEPAD E-School Program*, Wikipedia – the free encyclopaedia http://en.wikipedia.org/wiki/NEPAD_e-school_programme, Accessed 13 March 2006

Wikipedia:Six Sigma, *Six Sigma*, Wikipedia – the free encyclopaedia, http://en.wikipedia.org/wiki/Six_Sigma, Accessed 12 December 2005

Wikipedia:South Africa, *Economy of South Africa*, Wikipedia – the free encyclopaedia, http://en.wikipedia.org/wiki/Economy_of_South_Africa, Accessed 14 April 2006

Yin, R. K. *Case Study Research – Design and Methods*, Sage Publications Ltd, Beverley Hills, 1984

Yusof, S. M. and Aspinwall, E. M. Critical success factors in small and medium enterprises: Survey Results, *Total Quality Management*, Abingdon, July 2000, Volume 11, Issue 4-6, pp. S448-S463

Zeithaml, V. A. and Parasuraman, A. and Berry, L. L. *Delivering Service Quality, Balancing Customer Perceptions and Expectations*, The Free Press, New York, 1990

Appendix A: The Economy and Industry

The current economic environment in South Africa may be an important factor to consider in the study bearing in mind that economical conditions may affect growth and financial conditions of businesses. The study focuses on the year in which the work is done – 2005/2006.

The appendix first provides an economic analysis. It then describes why the information technology (IT) sector is chosen. Political and legal influences on IT organisations are discussed subsequently.

1.1. Economic Analysis

1.1.1. Interest Rates, Gross Domestic Profit (GDP), and Inflation

Changes in real interest rates affect the public's demand for goods and services mainly by altering borrowing costs, the availability of bank loans, the wealth of households, and foreign exchange rates (FED, 2005). A decrease in real interest rates lowers the cost of borrowing that leads businesses to increase investment spending. Low interest rates fuel the economy, are the driving force behind the country's improved GDP growth, and improve sentiment. South Africa is currently enjoying the lowest interest rate – 10.50% - in the last 24 years (Seria, 2005). This is spurring growth in South Africa as can be seen by the overall increase in the JSE, approximately 40% in 2005. An increase in interest rates may dampen the current growth of certain sectors in the country (Roubini, 2004).

Roubini (2004) believes that the GDP represents a broad measure of economic activity and signals the direction of overall aggregate economic activity. At present, real GDP values in SA indicate a growth of approximately 4.4% year on year (StatsSA, 2006). GDP is also pro-cyclical i.e. as GDP increases cyclical stocks increase and IT organisations are cyclical in nature (Goodspeed, 2004, p.19). Sullivan (1995) defines cyclical stocks as the stocks of those organisations whose earnings are

strongly tied to the business cycle (alternating rises and declines in the level of economic activity, which can extend over several years). This means that the prices of the stocks move up sharply when the economy turns up, move down sharply when the economy turns down. Durables such as cars, fridges, and computers are cyclical in nature because their purchases can be delayed. Since September 1999, South Africa's economy has been in an upward phase (McConnell and Blue, 2005), an encouraging environment for the IT sector.

Inflation is the rise in the general level of prices (Wikipedia:Inflation, 2006). Since September 2003 the inflation rate has remained consistently within the target range of 3% to 6% average per annum, currently (April 2006) at 4.5% (SARB, 2006).

Inflation, GDP, and interest rates are linked together. An analysis of the economy of South Africa (Wikipedia:South Africa, 2006) revealed that success in keeping inflation at bay gave the government room to drastically bring down interest rates. During 2003 alone interest rates were cut by 550 basis points, while between 2002 and 2006 interest rates were cut by a total 650 basis points. The cut in interest rates saw consumer spending rise, the construction sector boom and the sale of new vehicles reach record levels. This in turn generated much needed GDP growth. IT sector can be affected by future GDP figures, interest rates, and inflation. Future GDP figures can alter (Roubini, 2004):

- Interest Rates: Unexpectedly high quarterly GDP growth is perceived to be potentially inflationary if the economy is close to full capacity and would cause interest rates to rise.
- Stock Prices: Ambiguous. On one side, higher than expected growth leads to higher profits, this benefits IT. On the other, it may increase expected inflation and lead to higher interest rates adversely affecting IT organisations.
- Exchange Rates: Larger than expected GDP growth tends to appreciate the exchange rate following expected hikes in interest rates.

To illustrate the current growth rate with respect to IT, Monteiro (21 July 2005) discovered that South Africans (organisations and individuals) are buying more computers and laptops (notebooks), in line with international trends. International

research house Gartner says that worldwide computer shipments increased by 14,8%, or 48,9m units in the three months to June 2005 when compared with the same period in 2004, exceeding projections by two percentage points. Computer and notebook retailers say increases in South Africa over the same period outstrip the global average (Monteiro, 21 July 2005). The IT industry can currently take advantage of this positive state of affairs.

1.1.2. Exchange Rate

Anderson (2004) found that hardware components are sourced internationally (mainly in the East) in Dollar terms and sold locally in Rand. Exchange rate decisions are crucial to IT organisations dealing in hardware. As the Rand weakens, buying power internationally decreases because purchasing hardware internationally becomes more expensive. This is followed by increases in the prices of hardware in SA reducing the organisations' profit margin.

Hedging instruments are used by some organisations in the IT industry to control exchange rate exposure (Kruger, 2005). The Rand is relatively stable at the moment indicating good underlying economical fundamentals having been put in place by the relevant government authorities (I-Net, 2005).

1.1.3. US Economy

Kruger (2005) stated and Coetzee (2005) confirmed that the US economy affects the South African economy and industries. When the Federal Reserve increases interest rates the US stock markets are affected and, as a result, the JSE as well. This is especially true of the NASDAQ stock exchange (USA) and IT sector (JSE). A crash in the NASDAQ could lead to a crash in the local IT sector (Kruger, 2005; Coetzee, 2005).

1.2. Industry Selection

A specific sector (industry) is chosen to eliminate as many external and environmental factors as possible. Complications can be added by uncontrollable environmental factors such as general economic conditions, technology, public policies and laws, political environment, competition, and social and cultural changes. Owing to that, the study opts for organisations that operate in the same economic, technical, political and legal environment. The organisations in the same sector and industry are influenced relatively in the same way to external forces and this limits the amount of varying variables between organisations. If the economy stimulates growth in a certain sector, most organisations in that sector benefit in the same way. These organisations also have similar aims and procedures with regards to operations and TQM and can hence be compared on a more equal level.

An ideal sector selected is the one that:

1. is not overly complex in terms of structure (functional vs. divisional), e.g. Spar vs. Altech;
2. contains a sufficient number of organisations to have an adequate sample size, e.g. Telecommunication Services (three organisations listed) vs. Banks (twelve organisations listed);
3. carries the researcher's interest, e.g. Health (not interested) vs. Engineering (interested);
4. is fully understood by the researcher – this is an important element in understanding and formulating the background of the problem (Malhotra, 1999, p.42).
5. deals with products and processes fully understood by the researcher, e.g. Chemicals (no knowledge of chemicals) vs. Software and Computer Services (extensive knowledge of both);
6. promises sufficient accessibility in terms of the location, e.g. Resources (all across South Africa) vs. Information Technology (businesses located mostly in Johannesburg);
7. is influenced more by internal economic conditions as opposed to external/foreign economic conditions, e.g. Resources or Retail (influenced by

currency fluctuations) vs. Information Technology or General Industrials (more sensitive to internal economic fluctuations); and

8. consists of organisations dealing directly with customers as opposed to the one where it is not required (the first group may be, presumably, more interested in TQM incorporation), e.g. Resources (business interaction) vs. Cyclical Services (dependant on customer interaction).

The information technology sector is the industry of choice. It suits all the above points. Information technology can be further sub-divided into "Information Technology Hardware" and "Software and Computer Services". Both of these sub-sectors are included making a total of 24 organisations that can be investigated.

1.3. Industry Analysis

This section considers what is happening in and what external factors could influence the IT industry. These factors are discussed because they could shift the results of the TQM results. The main occurrences in SA that impact organisations and are touched on in detail are black economic empowerment, corporate governance, NEPAD, and new legislation.

Other factors not touched on in detail that could have a positive influence on the IT market include: a boom in both Internet and e-commerce applications, increased demand from the home-user market as computer literacy increases, strong economic outlook, the easing of supply and demand issues, the convergence of computers and mobile technology, demand for home entertainment systems, the continued proliferation of cheap PCs, and entry level criteria keep increasing, thus driving the replacement market demand i.e. replacing technology infrastructure in businesses (Who Owns Whom, 2003; Stones, 2005).

1.3.1. Government Influences

1.3.1.1. Black Economic Empowerment (BEE)

Alexander (2003) describes black economic empowerment as a government strategy to redress the imbalances in South African society created by apartheid, and an integral part of South Africa's transformation process, encouraging the redistribution of wealth and opportunities to previously disadvantaged communities and individuals, including blacks, women and people with disabilities. The empowerment process has been identified as crucial to the future viability of the country's economy (Alexander, 2003). A black empowered organisation is one that is at least 25.1% owned by black persons and where there is substantial management control. Ownership refers to economic interests, while management refers to executive directors. This is whether black enterprise has control or not (Alexander, 2003).

Increasingly, foreign and local organisations are seeking BEE partners to establish working relationships or joint ventures, thereby securing state approval for government contracts. A BEE partner may add extra points in a tender (Alexander, 2003). Because of this McLeod (2005) believes there have been dramatic changes in SA's information and communications technology (ICT) sector in the past year. Organisations in the sector concluded some of the more notable BEE transactions of 2005 (McLeod, 2005). As an example, Mustek made the biggest of the IT BEE announcements of 2003 selling a 25% share in itself to Safika Holdings for an estimated R224m. As part of the arrangement, Safika’s CEO, Vuli Cuba, became a deputy chairman of Mustek (Tredway, 2003). Since then Mustek has continued the BEE initiative strongly especially in terms of training (skills development) blue-collar workforce and promoting advancement in the workplace. Management feels that this is much more of a sustainable approach then just bringing in black holding organisations as this does nothing for the average black worker (Kruger, 2005). Since the initial move in 2003, Mustek is now SA’s third top empowered IT organisation, according to McLeod (2005), this is impressive, considering that it did not make the top 20 in 2004. The BEE drives undertaken by Mustek helps secure business deals with other private organisations and the government (Kruger, 2005).

1.3.1.2. King Report on Corporate Governance

Dekker (2006) describes that the King Report (King I and King II) represents a code of corporate practices and conduct aimed at promoting the highest standards of corporate governance in South Africa. The newly revised King II acknowledges that there is a move away from the single bottom line (that is, profit for shareholders) to a triple bottom line, which embraces the economic, environmental and social aspects of an organisation's activities. The report discusses: directors and their responsibilities; risk management; internal audits; integrated sustainability reporting; accounting and auditing principles; and compliance and enforcement issues. Information in all these is reported in the annual statements of listed organisations (Dekker, 2006).

Economically, the King II report sets new minimum standards that should be adhered to. To keep up with leaders in the industry, organisations must commit to following the report as the new way of a running a business. The financial impact of such is that it does cost money to implement these new procedures and hence decrease profits, but since it has become a new standard, all organisations should be implementing the new procedures (Wiener, 2004). Organisations should take the report seriously because those that fall behind and do not implement the code correctly may suffer the loss of new contracts with other organisations, hence losing profits and endangering the existence of the organisation in the long run.

By realising that transparency ultimately is the correct way to go, organisations may prosper as less bad publicity is received and its customer base may increase. By having both good corporate governance and ethics in place, the retention of current customers and an increase in new customers is ensured.

1.3.1.3. Government and Information Technology

According to a new report by research house BMI-TechKnowledge (or BMI-T), government is increasing the amount of money it spends on IT, primarily to improve and initiate e-government projects. This increased spending will focus on a number of projects to implement technology to simplify government processes. These include

initiatives such as the development of an integrated justice system, which will streamline the justice process, reduce backlogs of cases and improve safety for all citizens. IT will be used to improve processes, to drive down costs, reduce errors and save time and effort (Candy, March 2005).

BMI-T expects government IT spending to increase to R6,5-bn by 2007/2008, from R4,8-bn during the 2003/2004 period. And, the big winners in this increased spending will most probably be BEE organisations, in partnership with some of the larger, more established IT organisations. Government is starting to recognise the local IT organisations that may be used in the projects (Candy, March 2005).

1.3.1.4. Legislation

A recent legislative change has seen the removal of the restriction on Voice-Over-IP transmission (Emerick, 2004). Stones (2005) believes that this should increase the take-up of PCs. Internet service providers can now carry voice calls over their data networks, letting people make international phone calls via PCs. The removal of the Voice-Over-IP restriction means all manner of technical cost-savings. The cost of international calls is expected to drop considerably, as organisations lease bandwidth from their network suppliers rather than pay for call time. In fact, telephone organisations are becoming more like network service organisations using computers to communicate as opposed to the telephone infrastructure (Stones, 2005).

1.3.2. Proudly South Africa

The Proudly South African initiative is a campaign to promote South African organisations, products and services that are helping to create jobs and economic growth in the country. The organisation states that organisations who meet the standards set by Proudly South African can use the logo to identify themselves, their products and services. Supported by organised labour, organised business, government and community organisations, Proudly South African is thought highly of (ProudlySA, 2005).

Stones (2005) states that organisations are required to show their support for locally produced goods and to buy from empowered suppliers. There is belief that there would be more demand for IT organisations being Proudly South African (Stones, September 2005).

1.3.3. New Partnership for Africa's Development (NEPAD)

New Partnership for Africa's Development is an economic development programme of the African Union. NEPAD has embarked upon an "e-schools" programme to equip 600,000 primary and secondary schools in Africa with IT equipment and internet access within 10 years (Wikipedia:NEPAD, 2006). Kaplan (2005) and Coetzee (2005) hope that instead of using international organisations like DELL and HP improving their name and expertise, governments and private organisations might use African organisations such as Mustek and Pinnacle increasing their growth. In addition, employment of the locals from each relevant country will promote growth, education, and wealth.

Appendix B: Forms of Business Organisations

Four different legal forms of business organisation are most widely used – sole proprietorship, partnership, close corporation, and organisation. Goodspeed (2004) states that generally sole traders and partnerships constitute the majority of the businesses in the private sector of an economy, however, limited organisations account for the largest part of economic activity. Limited organisations differ from sole traders and partnerships in that ownership and management of the business are separated. Ownership is in the hands of shareholders that have the right to appoint the board of directors. Directors select the managers of the organisation to run the business in the best interests of the shareholders. The goal of the managers is to increase shareholders' wealth i.e. increase the current value per share of the existing shares (Firer et al, 2004, p.10). The directors have to report to shareholders at least annually on the performance of the managers. Two important types of limited organisations are (Goodspeed, 2004, p.5):

- Private limited organisations – the shares of private limited organisations cannot be sold on the stock exchange without the approval of other shareholders and without first offering them to existing shareholders.
- Public limited organisations – the shares of public limited organisations are listed (quoted) on and sold to the general public via stock exchanges.

The latter are the type of organisations that are investigated in this research. These organisations are more prone to implement TQM to gain a competitive advantage and increase market share in both the domestic and international markets. Any reference to organisations, businesses, etc. in this study implies that they are public limited organisations.

Appendix C: Theories of Total Quality Management

This appendix examines the origins of TQM discussing the theories developed and put forward by the founders of the quality movement - W. Edwards Deming, Joseph M. Juran, Armand V. Feigenbaum, and Philip Crosby.

1.1. W. Edwards Deming

Deming is one of the early pioneers of the quality movement having been credited with popularising quality control in Japan in the early 1950s. He is best known for developing a system of statistical quality control, although his contribution goes substantially beyond those techniques. Statistical quality control (SQC) is a branch of TQM based on statistical methods.

Deming (1982) identifies two types of variations within organisations known as "common causes" and "special causes". While common causes are inherent in the process special causes are not, and these special causes need to be identified. He views statistics as a management tool and relies on statistical process control (SPC) as a means of managing variations in a process (Ross, 1994, p.4; Bicheno, 1991, p.5).

Deming's (1982, p.16) well-known "14-point" plan outlines the responsibilities of management. He believes that management must lead quality and stresses that no point can be executed without the management's force. The fourteen points apply to all organisations, from small to large, and from service to manufacturing. They are summarised as follows (Deming, 1982, pp.16-49):

1. Create consistent message about quality, throughout the organisation for improvement of product and service.
2. Adopt the new philosophy of quality that requires a commitment to improve quality continuously and customer expectations increase.
3. Switch from defect detection (mass inspection) to defect prevention. Rather inspect the process than the end product.

4. End the practice of choosing suppliers based solely on price, move towards quality of product, reliability of delivery, and willingness to cooperate and improve.
5. Constantly and forever improve the system of production and service. Identify problems, minimise variations and work continuously to improve the system. The system is not confined to products and their direct processes, but to all supporting services and activities.
6. Adopt modern methods of training on the job. Let employees understand the concept of variation, statistical process control, improvement, and the total approach to quality.
7. Institute modern methods of supervision. Change the focus from quantity to quality. This implies a change from chasing to coaching and support.
8. Drive out fear. Management must create the environment that removes all possibility that improvement in quality will somehow penalise operators, through more work, loss of jobs, financial loss, or whatever.
9. Break down barriers between staff areas. This implies the removal of any organisational barrier that prevents quality improvement. This means improved visibility between sections and easier communications.
10. Eliminate numerical goals for the work force. Stop requesting improved productivity and unrealistic targets without providing methods to achieve it and don't have silly slogans that mean nothing.
11. Eliminate work standards and numerical quotas. This is in regards to natural variation in processes. It implies no standard can be exact so employees should not be penalised or rewarded for quotas beyond their control.
12. Remove barriers that hinder the hourly worker and focus more on pride of workmanship. These barriers might include unrealistic quotas and time pressure, short-term requirements for profit rather than quality, lack of investment in the right machines or tools, individual investment schemes based on output rather than group based schemes based on quality and improvement, and lack of management or consistency.
13. Institute a vigorous programme of education and training. Education must be widely based and continuing.

14. Create a structure in top management that will push every day on the above 13 points. This point stresses the continual nature of quality management and its long-term philosophy.

Deming developed what is known as the Deming chain reaction; as quality improves, costs will decrease and productivity will increase, resulting in more jobs, greater market share, and long-term survival. Improvement of the processes increases uniformity of output of the product, reduces rework and mistakes, reduced waste of manpower, machine-time, and materials and thus increases output with less effort. Other benefits of improved quality are lower costs, better competitive position, and happier people on the job (Deming, 1982, p.1).

Deming's argument is that competitiveness depends upon customer satisfaction. He believes customer satisfaction is created through meeting customer expectations, and continuous improvement of products or services. Quality is a fundamental customer requirement. It is determined not by forcing employees to work harder but by the system. The system is defined as inputs, and the manner in which these are processed.

1.2. Joseph M. Juran

Like Deming, Dr. Joseph Juran is given credit for developing Japanese quality in the 1950s. Perhaps the best-known Juran concepts are his definitions of quality, the concepts of "breakthrough", "internal customer", and the "quality trilogy". Juran, like Deming, also introduced statistical quality control (SQC) in Japan after World War II. As SQC caught on and became more popular, Japanese organisations incorporated it into a wider range of activities and developed it further. They created systems in which exclusive responsibility for quality was taken away from management and staff and replaced with organisation-wide, comprehensive TQM programmes in which every employee had a role (Ozeki, 1990, p.3).

Juran concentrates more on product satisfaction and hence customer satisfaction, and product dissatisfaction and hence customer dissatisfaction. He defines a product as the output of any process. Customer satisfaction is a result achieved when product

features respond to customer needs and product deficiencies are in all cases sources of customer dissatisfaction (Juran, 1992, p.7). Product satisfaction has its origin in product features and is why clients purchase the product. Product dissatisfaction has its origin in non-conformances and is why customers complain. He further states that a customer is anyone who is impacted by the product or process and differentiates between internal and external customers. Therefore, products can be for internal or external customers (Juran, 1992, p.8). He defines each as:

- External Customers – these are impacted by the product but are not members of the organisation that produces the product. External customers include clients who buy the product, government regulatory bodies, and the public.
- Internal Customers – they are impacted by the product, and are also members of the organisation that produces the product.

There are now two dimensions of quality, an external one concerned with matching customer requirements, and an internal one concerned with building the product or service correctly. Quality begins with a close understanding of who the users will be and how and where the product will be used. Without this customer orientation, good quality, he believes, is not possible.

The Juran trilogy are three processes used for the managing of quality. It uses the theory of the three managerial processes for financial management - financial planning, financial control, and financial improvement. Now the names change to (Juran, 1992, pp.14-15):

- Quality Planning – the activity of developing the products and processes required to meet customers' needs. It involves a series of universal steps (Juran, 1992, pp.27-274):
    - Establish Quality Goals
    - Identify the Customers
    - Determine Customer Needs
    - Develop Product Features
    - Develop Process Features
    - Develop Process Controls

- Quality Control – this consists of evaluating actual quality performance, comparing actual performance to quality goals and acting on the difference, i.e. the execution of plans.
- Quality Improvement – this process is the means of raising quality performance to unprecedented levels ("breakthrough"). It involves organisation infrastructure for quality, identifying specific needs for improvement, and providing the resources, motivation, and training for quality teams.

Juran (1992) believes good quality management requires the quality actions to be planned out, improved, and controlled. The process, consequently, can be seen as achieving control at one level of quality performance, then planning to be better and eventually achieving "breakthrough" to an improved level, and then once again controlling at the new level. It is a continuous process.

Juran (1992, p.40) emphasises that quality is not just a concern of production or even of total quality within an organisation, but extends further into the linkage between organisations, and includes all service organisation and operations. He terms this "Big Q" to realise the bigger effect of quality within organisations.

1.3. Armand V. Feigenbaum

Armand Feigenbaum, an American engineer, was the originator of "Total Quality Control", now often referred to simply as total quality. In the 1950s, he defined quality as (Feigenbaum, 1991, p.6):

> "Total quality control is an effective system for integrating the quality development, quality maintenance, and quality improvement efforts to the various groups in an organisation so as to enable production and service at the most economical levels which allow full customer satisfaction"

Feigenbaum (1991) concentrates more on managerial and technical leadership to bring about total control. He does have similar views as Juran with regards to

customer satisfaction (Feigenbaum, 1991, pp.7-9). He believes that the production cycle starts and ends with the customer, but in between many people and functions must play a role; in fact everyone has a role and the responsibility must be shared. Feigenbaum sees the quality professionals playing a central role and coordinating the entire process.

Feigenbaum (1991, p.11) referred to the "industrial cycle" which is the ongoing sequence of activities necessary to bring products from concept to market. Included in this cycle are marketing, design, purchasing, manufacturing engineering, manufacturing supervision and shop operations (production), inspection, shipping, and installation and service. As one moves through the cycle, there are requirements to be met at each stage, and these different requirements must be defined and communicated. This is where the quality professionals have a prime role. The total cost of quality (or non quality) accumulates through all these stages, and a total view of quality being managed through all the stages will lead to a lower overall cost.

Although Feigenbaum (1991) stresses the importance of top management in relation to quality, he does understand that effective human relations are basic to quality control. Total quality control provides the fundamental basis of positive quality motivation for all organisation employees and representatives, from top management through assembly workers, office personnel, dealers, and service people. A major feature of this activity is its positive effect in building up employee responsibility for, and interest in, product quality. In the final analysis of a product, it is a pair of human hands that performs the important operations affecting product quality. It is of utmost importance to successful quality-control work that these hands be guided in a skilled, conscientious, and quality-minded fashion (Feigenbaum, 1991, p.6).

Feigenbaum (1991, p.78) believes in a more linked organisational structure. The systems approach to quality begins with the basic principle of total quality control that customer satisfaction cannot be achieved by concentrating upon any one area of the organisation alone. Its achievement depends, instead, both upon how well and how thoroughly these quality actions in the several areas of the business work individually and upon how well and how thoroughly they work together. He goes on to state that a modern total quality system must be structured and maintained so that all key

activities-quality equipment, work force, information flow, standards, controls, and similar major activities-must be established not only for their own effectiveness but for their interrelated impact on total quality effectiveness (Feigenbaum, 1991, pp.81-82). Feigenbaum identifies statistical and engineering methods for the modern total quality system.

For the achievement of total quality systems, the major field of systems engineering and systems management has been adapted and applied to the particular needs of modern quality control. It is now a centre point of effective quality engineering. Quality management directed the development and on-going leadership of a strong, integrated-rather that fragmented-quality system which operates with economy, efficiency, and enthusiastic support throughout the entire organisation and plant wide organisation (Feigenbaum, 1991, p.84). This is Feigenbaum's approach to a modern total quality control system. He lists various techniques in his book *Total Quality Control* (1991) for the employees of an organisation to implement their individual responsibilities towards quality improvement.

In conclusion, Feigenbaum's (1991, pp.106-107) views on recognising an effective system quality system can be identified by twelve fundamental areas:

1. It controls quality on an integrated, organisation-wide basis that begins with the marketing conception and ends with customer satisfaction.
2. It provides for primary quality decision-making ties with upper management.
3. It fosters a sufficient budgetary base and technical competence to permit preventive effort rather than corrective effort.
4. It establishes quality control as a set of disciplines to be applied throughout the business.
5. It builds in quality control's coupling with customers on a positive feed forward basis providing a great deal of data about customer-use requirements before production.
6. It clearly structures and reports quality costs.
7. It makes quality motivation a continuous process.
8. It structures a unique technological contribution to the business through quality and reliability engineering work.

9. It provides for continuously measuring and monitoring actual customer quality satisfaction.
10. It provides good product service rapidly and economically.
11. It integrates product-safety and product-liability-control considerations with all aspects of the quality programme.
12. It adds a major, organisation wide work scope to the quality function. This makes quality control the technical and managerial extension of the general management of the organisation into the quality field.

1.4. Philip Crosby

The ideas of Philip B. Crosby are contained in his books *Quality is Free* (1979) and *Quality without Tears* (1984). Crosby (1984) believes quality must be made clear throughout the organisation and management play a key role in introducing quality. Quality must be integrated into the culture of the organisation (Crosby, 1984, p.10). A quality policy must be presented and followed and understood and communicated within the organisation. This is critical in an organisation and is no good just introducing tools to monitor quality.

In Crosby's mind there exist four absolutes of quality management.

The First Absolute – The Definition of Quality is Conformance to Requirements

The first absolute is implemented to improve quality and eliminate hassle at the same time. Crosby (1984, p.59) considers that quality improvement is built on getting everyone to do it right the first time (DIRFT). DIRFT is getting requirements clearly understood and then not putting things in people's way. Management has three basic tasks to perform for this:

- establish the requirements that employees are to meet;
- supply the wherewithal that the employees need to meet those requirements; and
- spend all its time encouraging and helping the employees to meet those requirements.

When it is clear that management policy is DIRFT, then all employees will be DIRFT and will take requirements as seriously as the management does. Crosby (1984, p. 64) strongly believes that quality has to be defined as conformance to requirements, not as goodness. Crosby (1984, pp.6-7) states:

> "An organisation can be vaccinated against non-conformance. It can be provided with antibodies that will prevent hassle…antibodies must be built into a management style that operates the organisation. The knowledge that they exist has to extend throughout the organisation. This extension serves to help those who make decisions (and every employee makes decisions) to keep from causing problems of quality."

All non-conformances are caused. Anything that is caused can be prevented. The organisation that wishes to avoid internal hassle, eliminate non-conformance, save itself a bundle of money, and keep its customers happy must be "vaccinated". To prepare the vaccine, certain key ingredients need to be combined. To administer it continually, the corporate body requires a strategy that requires three distinct management actions (Crosby, 1984, p.7):

- Determination – Management realises that their action is the only tool that will change the profile of the organisation.
- Education – Process of helping employees have a common language of quality.
- Implementation – Guiding the flow of improvement, this process never becomes complete.

The Second Absolute – The System of Quality is Prevention

The most visible of the expenses of conventional quality practice lies in the area of appraisal (Crosby, 1984, p.66). Appraisal is inspection or testing of the product. The problem with it is that it is always done after the fact i.e. after the error has occurred. Crosby (1984, pp.66-73) believes the system for quality is prevention, not appraisal.

Processes must be analysed and fixed so that the errors in the production process are not transpired onto the product/service.

Crosby (1984) maintains that the secret of prevention is to look at the process and identify opportunities for error. These can be controlled. Each product or service contains many components, each of which has to be dealt with to eliminate the cause of the problems (Crosby, 1984, p.68). Quality systems and processes must be built into the different activities so that errors occur less and less till at an absolute minimum.

Crosby (1984) believes it is management's responsibility to set up parameters guiding the plans to prevent errors and aligning quality throughout the organisation.

The Third Absolute – The Performance Standard is Zero Defects

Setting requirements is a process that is readily understood, but the need for meeting those requirements each and every time not so (Crosby, 1984, p.74).

Crosby (1984, pp.74-84) believes that every action of every step in manufacturing of a product/service has to be done properly as planned to make everything come out right that is, the job must be done right the first time.

Mistakes are caused by either lack of knowledge or lack of attention (Crosby, 1984, p.83). Both can be mended leading to a state of zero defects, which should be the management performance standard. The concept of zero defects is not impossible if processes are examined and corrected individually and not as a whole.

The Fourth Absolute – The Measurement of Quality Is the Price of Non-Conformance

Quality is never looked at in financial terms the way everything else is; it is always thought of in some relative fashion, as in degree of goodness (Crosby, 1984, p.85). Quality needs to be measured against cost and the cost of quality can be divided into two areas:

1. The price of non-conformance – expenses involved in doing something wrong, e.g. corrections and warranty cover.
2. The price of conformance – what is necessary to spend to make things come out right, e.g. prevention efforts and quality education.

These prices can then be used to monitor the progress of the organisation if improving or as a basis for finding out where the most lucrative corrective-action opportunities reside (Crosby, 1984, p.86).

Crosby (1984, p.99) believes there is one path to quality as he states:

> "That is the road we have to lay out – the path of our journey. It is made up of fourteen things that we have to do something about in a certain order. Then we lie out the same fourteen blocks again and keep building. The blocks get more familiar and comfortable as we repeat, but they provide the foundation forever."

His fourteen steps for quality improvement are as follows (Ross, 1994, pp.6-7):

1. Management commitment – communicate need for quality to entire organisation.
2. Quality improvement team – for a team to oversee improvements.
3. Quality measurement – establish measurements appropriate to every activity.
4. Cost of quality – estimate costs of quality to identify areas for improvement.
5. Quality awareness – raise quality awareness among employees.
6. Corrective action – take corrective action as a result of steps 3 and 4.
7. Zero defect planning – for a committee to plan a programme appropriate to the organisation and its culture.
8. Supervisor training and employee education – all levels must be trained in how to implement their part of the quality improvement programme.
9. Zero defect day – schedule a day to signal to employees the organisation's new standard.
10. Goal setting – individuals must establish improvement goals.
11. Error-cause removal – employees should be encouraged to inform management of any problems.

12. Recognition – give public, non-financial appreciation to those who meet their quality goals or perform outstandingly.
13. Quality councils – composed of quality professionals, councils should meet often to share experiences, problems, and ideas.
14. Do it over again – continuous quality improvement.

Appendix D: Managing Quality in Service Organisations

As with manufactured products, the key to quality in service delivery is customer satisfaction. In service delivery, customer satisfaction means fulfilling expectations which, according to Drummond (1992, p.99-108), denotes:

- Identifying important determinants of quality – many variables affect perceptions of service quality; the best thing to do is to find out what matters, and concentrate upon providing it.
- Managing customer expectations – if expectations are too high, the customer will always be disappointed, so management must learn to undersell rather than to oversell; this way expectation is managed.
- Managing impressions of product quality and service quality – service delivery is like a "theatrical performance" and that staff must act the part. Customers form conclusions on impressions of the organisation based on the impressions of the staff and must be managed not to shock or disappoint consumers, e.g. pension plans are best presented by older employees as opposed to the young, since dealing with people closer to retirement.
- Customer education – education can be used to create interest and is a subtle and relatively inexpensive means of drawing attention to services.
- Developing reliable support systems – technology should be designed to facilitate quality service.
- Soliciting feedback – the absence of complaints does not necessarily imply satisfaction as customers can vow never to return, so the organisation must take the initiative and solicit feedback.
- Concentrating on time - time is a powerful weapon, management must concentrate not only on doing things right, but doings things quickly. Customers appreciate this and return.

Appendix E: Malcolm Baldrige Quality Award Criteria

The 1996 and 2006 award criteria are shown to illustrate some examples of what organisations are evaluated on and how they are weighted.

Table 4.6 *Examination items and scores*

Item		*Score*	*Points*
1.0	**Leadership**		90
	1.1 Senior Executive Leadership	45	
	1.2 Leadership System and Organization	25	
	1.3 Public Responsibility and Corporate Citizenship	20	
2.0	**Information and Analysis**		75
	2.1 Management of Information and Data	20	
	2.2 Competitive Comparisons and Benchmarking	15	
	2.3 Analysis and Uses of Company-Level Data	40	
3.0	**Strategic Planning**		55
	3.1 Strategy Development	35	
	3.2 Strategy Deployment	20	
4.0	**Human Resource Development and Management**		140
	4.1 Human Resource Planning and Evaluation	20	
	4.2 High Performance Work Systems	45	
	4.3 Employee Education, Training and Development	50	
	4.4 Employee Well-Being and Satisfaction	25	
5.0	**Process Management**		140
	5.1 Design and Introduction of Quality Products and Services	40	
	5.2 Process Management: Product and Service Production and Delivery	40	
	5.3 Process Management: Support Services	30	
	5.4 Management of Supplier Performance	30	
6.0	**Business Results**		250
	6.1 Product and Service Quality Results	75	
	6.2 Company Operational and Financial Results	110	
	6.3 Human Resource Results	35	
	6.4 Supplier Performance Results	30	
7.0	**Customer Focus and Satisfaction**		250
	7.1 Customer and Market Knowledge	30	
	7.2 Customer Relationship Management	30	
	7.3 Customer Satisfaction Determination	30	
	7.4 Customer Satisfaction Results	160	
	Total points		**1000**

Source: *1996 Award Criteria*, ASQC

P	**Preface: Organizational Profile**	
P.1	Organizational Description	
P.2	Organizational Challenges	
2006 Categories and Items		**Point Values**
1	**Leadership**	**120**
1.1	Senior Leadership	70
1.2	Governance and Social Responsibilities	50
2	**Strategic Planning**	**85**
2.1	Strategy Development	40
2.2	Strategy Deployment	45
3	**Customer and Market Focus**	**85**
3.1	Customer and Market Knowledge	40
3.2	Customer Relationships and Satisfaction	45
4	**Measurement, Analysis, and Knowledge Management**	**90**
4.1	Measurement, Analysis, and Review of Organizational Performance	45
4.2	Information and Knowledge Management	45
5	**Human Resource Focus**	**85**
5.1	Work Systems	35
5.2	Employee Learning and Motivation	25
5.3	Employee Well-Being and Satisfaction	25
6	**Process Management**	**85**
6.1	Value Creation Processes	45
6.2	Support Processes and Operational Planning	40
7	**Results**	**450**
7.1	Product and Service Outcomes	100
7.2	Customer-Focused Outcomes	70
7.3	Financial and Market Outcomes	70
7.4	Human Resource Outcomes	70
7.5	Organizational Effectiveness Outcomes	70
7.6	Leadership and Social Responsibility Outcomes	70
	TOTAL POINTS	**1,000**

Note: The Scoring System used with the Criteria Items in a Baldrige assessment can be found on pages 51–54.

Appendix F: Investors in People (IiP)

Over the past 12 years independent research in the UK has consistently shown that the Investors in People standard provides real business benefits to organisations of all sizes and across all sectors. The practical benefits of working towards and achieving the standard include (Bankseta, 2005):

- Improved earnings, productivity and profitability - Skilled and motivated people work harder and better, improving productivity.
- Customer satisfaction - IiP is central to helping employees become customer-focused thus enabling the organisation to effectively meet customer needs.
- Improved motivation - Through greater involvement, personal development and recognition of achievement, motivation is improved. This leads to higher morale, improved retention rates, reduced absenteeism, readier acceptance of change and identification with the organisation beyond the confines of the job.
- Reduced costs and wastage - Skilled and motivated people constantly examine their work to contribute towards reducing costs and wastage.
- Enhanced quality - Investing in people significantly improves the results of quality programmes. Investors in People add considerable value to The Excellence Model, ISO 9000, TQM and other quality management initiatives.
- Competitive advantage through improved performance - IiP organisations develop a competitive edge.
- Public recognition - IiP status brings public recognition for real achievements measured against a rigorous national standard. Being an IiP helps to attract the best quality job applicants. It may also provide a reason for customers to choose specific goods and services.

Appendix G: Various IT Quality Entities

This appendix highlights various IT quality management entities. These were adapted from a provider of IT service management training and mentoring (Melliar, 2004). It shows key aspects of each entity summarising what the entity is, its objective, and the potential outcome of each.

Category	Entity	What is it?	Objective	Outcome
Foundation Processes	ITIL	Best practice guidance for the Support and Delivery of IT Services.	Assists IT organisations on how to plan and setup policies and processes to manage the end-to-end delivery and support of IT services.	Provides an organisation with a solid foundation from which to manage IT Services.
Improvement Methodology	Six Sigma	A statistical process improvement methodology focussing on quality from a customer/user viewpoint.	To streamline processes by making them more efficient and effective. Assists in the identification of defects in processes and assists in solving the various problems. Also assists in the creation of process to eliminate the amount of re-work required following implementation.	Potential reduction in the number of defects within process driven activities. Best applied to processes that are already defined and being managed.
Measurement System	CMMI	A Capability Maturity Model for IT organisations that provide IT services. Based on the Software development CMM (Now CMMI).	The objectives are twofold. The first is to enable IT organisations to assess their capabilities regarding the delivery and support of IT Services using a five level process maturity scale. Secondly it provides IT organisations with directions on what processes require improvement to enhance the organisations IT service capability.	Provides a sound process maturity model that IT organisations can use to measure and improve the IT services supplied to customers/users.
Quality Initiative	BS15000	The first formal IT Service Management standard. A set of minimum requirements against which an organisations IT Service Management processes can be assessed.	To externally certify IT organisations as BS15000 compliant, providing organisations with proof that they are practicing best practice IT Service Management. Aligned to ITIL.	Organisations become formally BS15000 certified, assists with ISO accreditation and proves commitment to IT Service Management Quality.

Governance	COBIT	An audit focussed set of guidelines for IT processes, practices and controls.	IT Governance Checklist. Focus mainly on what should be in place within a well managed IT organisation.	Provides an organisation with a sound IT audit tool from which to identify what processes should be in place within an IT organisation.
Quality Initiative	EFQM European Foundation for Quality Management	EFQM provides a good model for those wishing to achieve business excellence in a programme of continual improvement. Consists of 9 high level criteria with a further 32 subcriteria. Mainly used within Europe as a total quality model with some organisations aiming for the European Quality Award.	Provides organisations with a structured model and detailed assessments geared towards climbing a 5 scale organisation maturity model. 9 high level criteria includes: 1. Leadership 2. People 3. Policy and strategy 4. Partnerships and resources 5. Processes 6. People results 7. Customer results 8. Society results 9. Key performance results.	A high maturity level gained within Europe is seen as a distinct business advantage and a commendable achievement. US equivalent is the Malcolm Baldrige Quality Award which in the US is a much sought after award and a high maturity level gained gives the organisation distinct advantages in the market.
Quality Initiative	ISO9000	A set of high level customer orientated, auditable standards for Quality Management Systems. Internationally recognised the standard intends to ensure an organisation's processes are controlled, repeatable and documented.	Aims to ensure that an organisation defines and documents its processes and they are practiced monitored, measured and improved. Applies to all areas within an organisation. Organisations are audited by external parties with a view to being ISO certified.	ISO certification is a globally recognised achievement and in some instances a prerequisite for doing business.
Quality Initiative	Malcolm Baldrige	A US quality initiative/award where organisations that apply are judged to be outstanding in seven areas: leadership, strategic planning, customer and market focus, information and analysis, human resource focus, process management, and business results. Effectively the equivalent of the EFQM for the US.	Provides a set of "best in class" criteria for organisations to achieve. This criteria has been developed over numerous years and is widely recognised as one of the most cost effective and comprehensive Quality performance assessments in the US.	Winners of the Malcolm Baldrige Award have not only seen an increase in business but have also seen internal benefits. These benefits have been realised through the identification of strengths and weaknesses from which to improve and an organisation working collectively to achieve a common goal.

Appendix H: Characteristics of Excellent Top Management

Reimann summarises the characteristics of excellent leadership as (1991, pp. 8-11):

- Visible, committed, and knowledgeable – they promote the emphasis on quality and know the details and how well the organisation is doing. Personal involvement in education, training, and recognition. Accessible to and routine contact with employees, customers, and suppliers.
- A missionary zeal – active in promotion of quality outside the organisation.
- Aggressive targets – Going beyond incremental improvements and looking at possibility of making large gains, getting the whole work force thinking about different processes – not just improving processes.
- Strong drivers – Cycle time, zero defects, six sigma or other targets to drive improvements. Clearly defined customer satisfaction and quality improvement objectives.
- Communication of values – effecting cultural change related to quality. Written policy, mission, guidelines and other documented statements of quality values, or other bases for clear and consistent communications.
- Organisation – flat structures that allow more authority at lower levels. Empowering employees. Manager as coaches rather than bosses. Cross-functional management processes and focus on internal as well as external customers. Interdepartmental improvement teams.
- Customer contact – CEO and other senior managers are accessible to customers.

Appendix I: Managers As Enablers

Whereas traditional management emphasises control and imposition in setting standards, in a quality culture the role of managers will be to provide the forum for employees to address priorities and work upon improvements.

Drummond (1992, p.137) states that quality is a product of the system. Instead of focusing upon ostensible outcomes, managers will need to concentrate upon the processes whereby results are achieved. A major part of a manger's role in a quality culture will be to work in a 'hands on' fashion with employees, continuously identifying new directions and the means of accomplishing change (Drummond, 1992, p.137). Cortada (1995) believes that the role of managers has changed because they have found it more effective to get things done by delegating increasing amounts of authority to well-informed employees. Their role shifted from telling employees what to do to facilitating employees' getting things done. That shift called for managers to train employees, to provide tools with which they could get work done, and to foster the use of teams to approach problems and processes. Managers can now have larger spans of control while improving the overall speed and quality of the processes within an organisation (Cortada, 1995, p.4). Management will stimulate ideas and shape the processes. Participation in a quality culture requires a more sophisticated model, whereby organisations abandon the traditional demarcation between managers and the managed and instead recognise that all employees will need to assume some managerial responsibility.

Appendix J: Supplier Evaluation

The key elements to evaluate suppliers are (Ray, 1995, pp.44-45):

- Competency of the supplier to undertake the tasks required by the buying organisation - This must include technical skill of staff at all levels within the organisation, operative, supervisory and managerial. Competency is also focused upon the human resources of the supplier and will include such factors as motivation, reward, training and development of all grades of staff. Evidence of this competency begins with a review of staff CVs, qualifications, past experience and attainments. It also includes details of investments in training on the part of the individual and the organisation.
- Capacity of the supplier to meet total needs - This element if the supplier has the physical, intellectual and financial resources to deliver the items or services required. One of the benefits of collaborative partnerships with suppliers is that they feel confident to decline work that they are unable to deliver, without being afraid of the buyer moving the whole contract to an alternative source.
- Commitment of the supplier to the customer, in terms of quality, cost driving and service, most particular, total quality, given that the other elements mentioned all stem from the achievement of and total commitment to quality. This commitment has to be enshrined in the organisation's psyche.
- Control systems - It is vital that the prospective supplier has appropriate and effective control and information systems in place. These include all the obvious resource control systems, inventory, costs, budgets, people and information.
- Cash resources and financial stability - The time and energy that needs to be devoted to the selection of an effective supplier means that it is vital that the supplier selected is financially sound and is able to continue in business into the foreseeable future, this can be seen by past business and records and current financial statements.
- Cost - The concept of total cost of acquisition is well established. In the past many buyers were seduced by low prices but subsequently ended paying a

higher cost in terms of quality failures, disputes, and increased management input.

- Consistency - A sample of a product or service is sometimes used to compare supplies and cannot be used without caution. It is vital that the prospective supplier is able to demonstrate that they can deliver at least consistently and, one hopes, improve levels of quality and service. Too often the 'sample' is produced with great care and attention to detail; once the order has been placed, subsequent output may not always be of the same standard.

Appendix K: Employee Involvement

Employee involvement can be created in many ways (Lawler III, 1992, pp. 11-37; Ross, 1994, pp.120-126; Balachandran, 2004, pp. 178-193):

- Redistributing Power – moving power downward in organisations often requires special activities and structural changes. This could include quality circles, participation groups, and quality committees. The general idea of this is to add decision making ability to all employees i.e. make their suggestions and ideas heard (more participative management).
- Training and Development - increases the skill level. This increases communication among departments and workers tend to have a view of the organisation as a whole. Problem solving ability should be taught to aid in increasing the TQM development process. Without the right skills, it is impossible for individuals to participate in the business and influence its direction.
- Selection – choosing from a group of potential employees. Examines more than just ability, this could include personality tests and an overall assessment, this could be regarding not just the specified role and what it takes but whether the employee fits the organisation and its beliefs.
- Performance Appraisals - serve as a diagnostic tool for development of the individual, team, and organisation – can be used to determine reward levels, aid career development, improve communications, and facilitate understanding of job duties.
- Compensation Systems – as opposed to being based on individual performance that creates competitive atmosphere, TQM compensation rewards team strategies and quality management within that team. This increases involvement, commitment, and communication within the business.
- Rewarding Performance – basing rewards on organisational performance is one way to ensure that employees are involved in and care about the performance of the organisation. It also helps ensure that they share in gains that result from any performance improvement. All behaviour is goal directed and goals are determined by the availability of rewards or punishments.

- Sharing Information – sharing of information about the business. Without business information, it is difficult for individuals to understand how the business is doing and to make meaningful contributions to the general directions of the business.

Appendix L: Employee Education

Certain criteria need to be taught to employees (Crosby, 1984, pp.156-171):

- Operating management people must understand how the cost of quality is put together and how it applies to their area.
- Individuals involved in review and planning must understand the concepts of corrective action and problem analysis.
- Members of quality improvement teams who determine recognition needs for quality should have a special course on recognition to make certain that they put things in proper perspective.
- A system of communication should be designed, set-up and taught to make communication easy within an organisation.
- Supplier quality management workshops need to be conducted for all personnel who are going to be involved in relationships with suppliers.
- Emphasis on procedural and product qualification to help people recognise that it is important to take procedures seriously as they are developed.
- The organisation policies should be taught and made visible to create that quality atmosphere.
- Representatives of the advertising agency and advertising function to understand the policies of the organisation and portray them correctly to possible customers.
- CEO needs personal awareness to understand the particular role assigned to the job. This means executive education.
- Senior executives need to go to executive education and to workshops on their specific functions to understand quality in each function, not just their own.
- Managers need more working-level information about the process than the senior executives, so they need to attend the management education.

Appendix M: Just In Time (JIT)

Drummond (1992) explains that JIT production reverses conventional approaches to manufacturing:

- First sell it, and then make it – nothing is produced until a customer is identified. This eliminated the need for warehousing and other costs associated with inventory holding.
- Production is planned backwards instead of forwards – staff responsible for the final operation receive the production plan first, determine their needs and pass the plan backwards.
- 'Pull' instead of 'push' systems of production – designed to eliminate stock and facilitate flexibility.

The main problem of JIT, according to Drummond (1992) and Ross (1994), is that stockless production leaves organisations extremely vulnerable to supply failures and the effects of industrial action.

Appendix N: Factors Affecting Share Price Performance

Shareholders own the organisation through the purchase of shares in the organisation (Goodspeed, 2004, p.5). A share is one of a number of equal portions of the capital of an organisation. The liability of shareholders for the debts of the organisation is limited to their investment in the organisation i.e. if the organisation is wound up the maximum shareholders can lose is the amount paid for the shares (Goodspeed, 2004, p.5).

According to Firer et al (2004), the cash payoff to owners of common stocks comes in two forms:

1. Capital gains (losses) - arise through changes in the price of an organisation's shares.
2. Dividends – a portion of the organisation's profits.

Some corresponding factors of each are examined:

1. Factors such as operating income, capital structure, profitability ratios, etc.
2. Dividend policy.

1.1. Capital Structure

Capital structure refers to the specific mixture of long-term debt and equity the organisation uses to finance its operations. The mixture chosen affects both the risk and value of the organisation (Firer et al, 2004, p.5). All organisations must, at varying times, obtain capital. To do so, an organisation must either borrow the money (debt financing); sell a portion of the organisation (equity financing), or both. How an organisation raises capital depends a great deal on the size of the organisation, its life cycle stage and its growth prospects (Firer et al, 2004, p.494). Capital structure decisions can have important implications for the value of the organisation (Firer et al, 2004, p.523). According to Firer et al (2004) and Brealey and Myers (1991) capital structure affects an organisation's cost of capital. Cost of capital is the discount rate appropriate for the organisation's overall cash flows (required return for the

organisation). When cost of capital is minimised, the value of the organisation is maximised. This is because values and discount rates move in the opposite direction. Thus, capital structure affects the organisation's value.

1.1.1. Illusion of Wealth

Financial leverage refers to the extent to which an organisation relies on debt. The more debt financing an organisation uses in its capital structure, the more financial leverage it employs (Firer et al, 2004, p.525). Firer et al (1994) and Brealey and Myers (1991) believe as financial leverage increases, sensitivity of earnings per share (EPS) increases. This would imply that by increasing the debt when profits are good increases EPS. This creates an illusion of wealth because the value of the organisation increases just because more debt is taken on.

According to Firer et al (2004), the more the organisation borrows, the more it is worth. This is because interest paid on debt is tax deductible. As a result, the organisation is able to reduce its tax burden because the interest that it pays reduces its taxable income. This is known as the tax shield. The gain in value of the organisation is just equal to the present value of the interest tax shield (Firer et al, 2004, p.547).

Firer et al (2004) state that the problem lies with the fact that interest must be paid on debt. The cost of capital declines because of this (interest payments increase as debt increases). Interest must be paid on the debt regardless of an organisation's profit. As debt rise, so too does the probability that the organisation will be unable to pay its bondholders what was promised. The organisation's value is then reduced by the present value of the potential future insolvency costs. These costs grow as the organisation borrows more and more, and eventually overwhelm the tax advantage of debt financing (Firer et al, 2004, p.547). It is assumed that the organisations listed in the IT sector of the JSE are aware of this and using good financial leverage principles. When analysing the organisations year to year, it should be checked that the organisations are not in essence "buying earnings" by increasing its debt structure

giving the illusion that EPS is increasing whereby creating a factor in driving the share price upwards.

1.1.2. Dividend Policy

Brealey and Myers (1991) maintain that the dividend policy looks at the time pattern of dividend payout i.e. should the organisation pay out money to its shareholders, or should the organisation keep that money and invest it for its shareholders.

An argument for the fact that dividend policy is irrelevant exists from some authors because the individual investor is able to make homemade dividends if the policy is altered to one not agreeable by the investor. Homemade dividends imply that dissatisfied shareholders can alter the organisation's dividend policy to suit themselves by reinvesting dividends or selling shares of stock (Firer et al, 2004, p.564). This means that, in theory, dividend policy is irrelevant. However, Brealey and Myers (1991) point out that this does not account for the real-world factors such as taxes and flotation costs. Investors in South Africa are not taxed on dividend income that they receive. They are, however, subject to capital gains tax on the difference between the selling and buying prices of shares (Firer et al, 2004, p.565).

Firer et al (2004) assert that another factor to consider is secondary tax on organisations (STC); this is a tax payable by an organisation proportional to the size of the dividend it declares. STC is greater than capital gains, therefore present value of tax is lower if dividend payments are kept within the organisation and used to increase the value of the organisation for share growth. With the dividend not being paid out, the organisation can re-invest, be it in Treasury Bills or positive net present value (NPV) projects. With this, the capital gains of the return will be higher in the future.

Ross, Westerfield, and Jordan (1995) emphasise that this tax disadvantage of dividends does not necessarily lead to a policy of paying no dividends. All other things the same, when personal tax rates are higher than corporate tax rates; an organisation will have an incentive to reduce dividend payouts. However, if personal

tax rates are lower than corporate tax rates, an organisation will have an incentive to pay out any excess cash in dividends (Ross, Westerfield, Jordan, 1995, p. 512). The excess cash invested will result in a different future cash flow depending if it is invested on a personal or corporate level.

Firer et al (2004) describe situations where certain real world factors favour a high payout. These would be the desire for current income and uncertainty resolutions (Firer et al, 2004, p.569). Desire for current income holds for investors that need the money more at present, e.g. retirees. A high dividend policy also benefits shareholders because it resolves uncertainty because future cash flows are less certain than present ones. These factors suggest that the organisation paying the larger dividend will almost always sell at a higher price (Ross, Westerfield, Jordan, 1995, p. 514).

There are positive factors for both options of dividend payout. Even though it seems that dividend policy is irrelevant, this does not imply that it is not important. The assets of the organisation are not affected by the dividend policy yet the share price alters due to two important concepts. These are information content of dividends and the clientele effect.

Information Effect

The information effect is the market's reaction to a change in organisation dividend payout (Firer et al, 2004, p.570; Brealey and Myers, 1991, pp.375-376). Dividend changes convey information about the organisation to the market. It is found with some consistency that share price rises when the current dividend is unexpectedly increased, and they generally fall when the dividend is unexpectedly decreased. Organisations only cut dividends with great reluctance. Thus, a dividend cut is often a signal that the organisation is in trouble (Firer et al, 2004, pp.569-570).

Clientele Effect

Ross, Westerfield, Jordan (1995) and Firer et al (2004) define the clientele effect as an argument that shares attract particularly different groups of investors depending on the dividend policy. When an organisation chooses a particular dividend policy, the only effect is to attract a particular clientele. Recognising that some groups such as private investors require low payout whilst others like pension plans require a high

payout, organisations may alter the dividend policy depending on the needs of the stockholders. This just leads to a simple supply and demand argument. This implies that if the different dividend policies are in equilibrium i.e. 50% of groups require high payout and 50% of organisations offer a high payout, dividend policy makes no change to the share price performance. If not in equilibrium, the organisations with a dividend policy in demand will increase in value until equilibrium is met (Firer et al, 2004, p.571). This sharply reduces the impact of any individual organisation's dividend policy on its market share (Ross, Westerfield, Jordan, 1995, p. 531).

Reality

Firer et al (2004) believe that in practice, many organisations appear to follow a compromise dividend policy. Such a policy is based on five main goals; these are in order of importance (Firer et al, 2004, p.575):

1. Avoid cutting back on positive NPV projects to pay a dividend.
2. Avoid dividend cuts.
3. Avoid the need to sell equity.
4. Maintain a target capital structure.
5. Maintain a target dividend payout ratio.

This means that most organisations offer a residual dividend approach; this is a policy under which an organisation pays dividends only after meeting its investment needs while maintaining a desired debt/equity ratio (capital structure). A residual dividend policy, either a fixed fraction of that quarter's earnings or a fixed fraction of yearly earnings, adds stability to a dividend policy.

This study ignores dividend policy. It is noted that if the dividend market is not in equilibrium, the dividend policy might affect share price performance. It is assumed that organisations are practicing the residual dividend approach, hence considering all the above factors. Over the long-term, the values of the organisations are not affected greatly by dividend policies and are ignored. This study is also cross-sectional and not longitudinal. This implies that the study does not examine the current supply and demand for different dividend policies. It assumes each organisation's policy as given.

1.2. Mergers and Acquisitions

Mergers and acquisitions deal with some sort of redistribution or concentration of control. Mergers imply two organisations combining whereas acquisitions imply an individual or organisation gaining control of the management and assets of another organisation (Firer et al, 2004, p.759). This new synergy affects the financial situation of all parties concerned because it costs money to do, total assets change, and turnover changes. This can be seen in the annual financial statements. Mergers and acquisitions hope in some way to increase value of some of the parties involved. This increase could be due to (Firer et al, 2004, pp.775-779):

- Synergy - combined organisation has value that is greater than the sum of the values of the separate organisations.
- Revenue enhancement - combined organisation may generate greater revenues from marketing gains, strategic benefits, and increase in market power.
- Cost reductions - combined organisation may operate more efficiently due to economies of scale (average cost per unit of producing goods and services decreases).
- Lower taxes – Combined organisation will have a lower tax bill.

Firer et al (2004) accept that an acquisition can also create the appearance of growth in earnings per share (EPS). This is a purely financial side effect and might not make economic sense. This may fool investors into thinking that the organisation is doing better than it really is, just as it can increase debt to create the illusion of wealth.

Mergers and acquisitions are ignored in this study. Mergers usually imply a new organisation is formed and this would be noticeable in the analysis of the organisations (Firer et al, 2004, p.759). Acquisitions do affect the financial situation of organisations, but it is assumed that over the long-term, the cost incurred is received back, if not increased, and management styles reflect the acquirers'. This study does not analyse each organisation in detail with respect to income and where it comes from and expenditure and what it is spent on.

Appendix O: Cost of Total Quality Management

Zeithaml (1990, p. 8) and Buzzell and Gale (1987, p.7) also examine the negative view of implementing TQM. Investments to improve quality may not come back as profit gains. Indeed, a lot of money is wasted in organisations every year in the name of quality improvement. They source this money wastage from adding costly service features that are unimportant to customers and spending training money unwisely. TQM is a vast and complicated subject and must be approached slowly and systematically until each level of the organisation is affected. An organisation must be analysed to determine exactly how to implement TQM, as the approach towards TQM implementation differs between organisations (Obert, 1996, p. 1). If implemented effectively, though, there is a definite positive relationship between quality and profitability (Zeithaml, 1990, p. 9; Berry et al, 1989, p. 4; Buzzell and Gale, 1987, p.7). The database from the Profit Impact of Market Strategy (PIMS) programme shows this association.

Singhal and Hendricks (1999) developed the root cause why TQM has come under increasing criticism from many business gurus for delivering lacklustre economic returns. Unrealistic expectations, quick-fix mentality, and competition from other tools are some reasons organisations have soured on TQM. Some organisations may have adopted TQM with inflated expectations of what it could deliver. TQM was expected to have the answers. When TQM did not deliver the hoped-for-results, it was deemed a failure. Furthermore, contrary to the TQM philosophy, many organisations adopted TQM seeking instant and swift gratification. Often TQM efforts were measured against short-term financial performance. When short-term improvements did not materialise, many organisations became disillusioned. Proponents of TQM are unhappy with its skewering in the business press. Some have stated that, while hard to establish, the link between quality and financial performance is strong. However, this has not been enough to counter the criticisms. The reality is that the negative publicity about TQM has caused organisations to question the relationship between TQM and financial performance. TQM is not a quick fix for all corporate problems and corporations' disillusionment with the theory is the result of managers who had unreasonable expectations. TQM is difficult to implement, as it requires major organisational changes that need time and commitment (Singhal, 1999, pp. 35-43).

Appendix P: Materials Used When Approaching Organisations

Representative Letter:

Dear Respondent

RE: TOTAL QUALITY MANAGEMENT SURVEY

You have received the enclosed questionnaires as part of a survey investigating the implementation of Total Quality Management (TQM) at various organisations in the Information Technology sector. My name is Jaro Vomacka and I am doing my Masters in Industrial Engineering at the University of Witwatersrand. I am researching at what different levels organisations in the IT sector are at relative to TQM. One of my main tasks of my research is to provide management with relevant, accurate, reliable, valid and current information with regards to TQM in South Africa. At the completion of the research project, each business that participated will be given a copy of my research findings. These findings can then be used as a benchmark to analyse where the organisation stands with respect to TQM and highlight which areas need improving or where opportunities may exist for advancing the organisation. I have chosen to approach this organisation because it is one of many in the required sector, located in Gauteng, it is a sector of interest and one I have knowledge of being an Electrical and Information Engineer.

South Africa is now subject to international business competition and TQM is becoming more accepted as a powerful solution to the reaction of increasing domestic and global competition and the pervasive need to integrate the several organisational functions for improvement of total output of an organisation. Poor quality in the average organisations costs about 20 percent of revenues, most of which can be avoided by adopting good quality practices. TQM re-engineers the departments for better efficiency targeted for the goal of customer satisfaction. TQM can shorten cycle time, improve quality, increase productivity and reduce costs. All these factors point to increased customer satisfaction, increased customer base, increased profit in the long-term, and an improvement in financial performance. The results of this research can aid you in determining what principles are being implemented and what are lacking in your organisation.

I would be very grateful if you and your staff could assist in my research by taking time to complete the questionnaires and provide me with an insight into quality assurance within your organisation. The answers will be treated confidentially, and will be used for research purposes only. The names of any employees will not appear anywhere on the questionnaire. The questionnaire will take you about ten minutes to complete. I would appreciate if you would distribute the questionnaires in the manner agreed i.e. minimum of three people in each of four different departments (minimum of 12 people). Should you have any problems with the questionnaires or the process, please do not hesitate to contact me on 082 0804034 or 011 6806134.

Please could you keep all completed questionnaires at your office, and I will make arrangements to collect them. Your cooperation and assistance are very much appreciated.

Kind Regards,

Mr. J. Vomacka

Respondent Letter:

Dear Respondent

RE: TOTAL QUALITY MANAGEMENT SURVEY

You have received this questionnaire as part of a survey investigating the implementation of Total Quality Management at various organisations in the Information Technology sector. South Africa is now subject to international business competition and TQM is becoming more accepted as a powerful solution to the reaction of increasing domestic and global competition and the pervasive need to integrate the several organisational functions for improvement of total output of an organisation. Poor quality in the average organisations costs about 20 percent of revenues, most of which can be avoided by adopting good quality practice. The goal of TQM is customer satisfaction and TQM re-engineers the departments for better efficiency targeted for customers. TQM can shorten cycle time, improve quality, increase productivity and reduce costs. All these factors point to increased customer satisfaction, increased profit in the long-term, increased customer base and this leads to an increase in financial performance.

I would be very grateful if you could assist in my research for my Masters Degree in Industrial Engineering at the University of the Witwatersrand (WITS) by taking time to complete the questionnaire and provide me with an insight into quality assurance within your organisation. Your cooperation and assistance are very much appreciated.

As you work through the questionnaire, you will find some questions which ask about yourself whilst others about the organisation and your opinions. For these opinion questions, there are no right or wrong answers. What is important is to know just what you think and the questions are answered to the best of your ability - as honestly and fully as you can. The answers you give will be treated confidentially, and will be used for research purposes only. Your name will not appear anywhere on the questionnaire. The questionnaire will take you about ten minutes to complete. If you have any questions about completing the questionnaire, please contact your head of department.

The completed questionnaire should reach the quality manager/HR manager/marketing manager (person managing quality) in the envelope provided by 30 September 2005.

Thank you for taking this research seriously and assisting my results making them more meaningful.

Thank you again for your assistance,
Kind Regards

Mr. J. Vomacka

Appendix Q: Questionnaire

HOW TO COMPLETE THE QUESTIONNAIRE

Questions will be asked in either one or two ways - either a direct answer is required or a scale exists where an opinionated answer is required (rating). Please mark only one box by placing a cross in it.

The direct answers require a **YES**, **NO**, or **DON'T KNOW**

To rate a scale item, please cross the level of agreement for the statement.

You may now begin.

	Y	N	D

1. Department (e.g. Accounting, Marketing, IT, Research and Development etc.)

_____

2. Position in organisation (e.g. sales manager, personal assistant, network administrator etc.)

_____

A. Attitude and Involvement of Top Management

		Y	N	D
1.	Is your organisation ISO9000 Series Certified (ISO9001;ISO9004 etc.)?	Y	N	D
(I)	If YES, since when?_____			
2. (I)	Does your organisation have a formal written quality policy?	Y	N	D
(ii)	If YES, has the organisation improved on that in any way?	Y	N	D
	AND, does this policy contain:			
(iii)	a brief statement of corporate intent to quality	Y	N	D
(iv)	the minimum actions to be taken by organisation divisions with respect to quality	Y	N	D
(v)	specific goals (measurements) to be attained regarding quality	Y	N	D
3.	Is the concept of quality made visible by management?	Y	N	D
4.	Does management drive the quality?	Y	N	D
5.	Is there a quality culture in your organisation? (Attitudes, beliefs, visions etc. about quality)	Y	N	D

6. There are reporting mechanisms for feedback to top management within the organisation.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree

7. Personal Leadership improvement plans are developed based on feedback mechanisms.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree

8. Senior executives are personally involved in the ongoing communication of quality values oriented at the customer/market.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree

B. **Information Systems and Information Technology**

1.	Is the organisation involved in any process, product or organisation benchmarks?	Y	N	D
2.	Is the "Best-In-Class" organisation known, studied and followed? (The organisation leading your sector)	Y	N	D
3.	Are there any actions to try close the gap between you and your superior organisation?	Y	N	D
4.	Do you rate your suppliers in terms of quality?	Y	N	D
	If YES, do you continuously measure them and make adjustments?	Y	N	D

5. Competitive quality data are used to create strategies for market, product, technical, environmental, and resource developments.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree

C. **Strategic Quality Planning**

1.	Are there any quality surveys within the organisation in place?	Y	N	D
2.	Do you know the mission of the organisation?	Y	N	D
(I)	If YES, is it quality oriented	Y	N	D

3. In setting goals, YOUR department sets some quality goals.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree

4. Human resource development requirements are considered during the planning process.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree

5. An integrated strategic quality planning process exists, which incorporates a wide variety of internal and external information sources, including customer, competitive, environmental, supplier, co-worker, and society data.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree

6. Productivity improvement is considered when developing operational performance improvement plans.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree

7. Specific short-term and longer-term quality and performance goals, including an action plan goal to achieve substantial improvement in key indicators, have been set.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree

8. Longer-term plans are committed for such expenditures as training and education.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree

9. The organisation's quality values serve as a foundation for strategic planning.

Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree

D. Human Resource Development and Management

1.	Does management encourage individual involvement?	Y	N	D
2.	Are you rewarded for participating in quality?	Y	N	D
3.	Are you or have you ever given incentives to participate in quality improvement?	Y	N	D
4.	Do you participate in any training?	Y	N	D
(I)	If YES, is it quality oriented at all?	Y	N	D

(ii) and how often?

Daily	Weekly	Monthly	Quarterly	Yearly

5.	Do employees shift in functions within the organisation or get taken around to understand each persons job?	Y	N	D
6.	Is quality attitude looked for in new recruits?	Y	N	D

E. Management of Process Quality

1. How often is quality measured to gauge the overall direction of quality within the organisation?

Daily	Weekly	Monthly	Quarterly	Yearly

2.	Are employees aware of a Total Quality Management (TQM) programme?	Y	N	D
3.	Have any processes been simplified in your department?	Y	N	D
4.	Have any processes been made more effective in your department?	Y	N	D
5.	Is there an understanding for the need to continuously promote TQM?	Y	N	D
6.	Do you practice product inspection? (inspect final product)	Y	N	D
	or process control? (inspect processes leading to final product)	Y	N	D

7. What percentage of the work conducted by your department is inspected?

0%	25%	50%	75%	100%

8.	Can the organisation pinpoint any problems immediately e.g. vendor problem, lack of expertise, poor preventive maintenance, old machines etc.?				Y	N	D

9.	Customer input is reviewed to determine how quality, cycle time, and overall performance can be improved.					
	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	

F. Customer Focus and Satisfaction

1.	When deciding what constitutes a quality product/service, customer requirements are researched and must be known.					
	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	

2.	Does the organisation record all customer complaints?	Y	N	D
3.	Does the organisation process customer complaints to try prevent those problems from occurring again?	Y	N	D

4.	My superiors/quality council regularly tell me what the key quality requirements of my customers are.					
	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	

5. I consider the following people to be MY customers:

(I)	other departments within my organisation; or	Y	N	D
(ii)	the customers of the organisation; or	Y	N	D
(iii)	I don't have any.	Y	N	D

6.	Customer feedback is a key to understanding customer requirements - this includes surveys, complaints, gains and losses of customers, third-party telephone surveys.					
	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	

7. (I)	Are warranties and commitments to customers made and adhered to?	Y	N	D
(ii)	Are warranties and commitments to customers compared to those made by key competitors?	Y	N	D

8.	Commitments extend beyond direct customers to the consumer. Methods include warranties and a toll-free number.					
	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	

G. Management Structure and Teams

1.	Does a quality council/steering committee exist or any cross-functional quality improvement teams?	Y	N	D

2.	How often does YOUR superior/manager participate in quality team meetings in your department?							
	0%	25%	50%	75%	100%			
3.	Are you a member of some form of Quality Improvement Team?					Y	N	D
4.	If YES, does your team have the authority to implement solutions to identified problems?					Y	N	D
5.	Do you know who your suppliers are, internally and externally?					Y	N	D
6.	Can a process that you know of be simplified?					Y	N	D
(I)	If YES, have you told anyone of this?					Y	N	D
(ii)	Has it been done?					Y	N	D

H. **Cost of Quality**

1.	Does your organisation calculate a cost of quality in monetary terms?	Y	N	D

If YES, Continue, If NO, You Are Done, Thank You

2. Which of the following elements are included in your organisations calculation of the cost of quality?

(I)	prevention costs - incurred in preventing defects from occurring, such as quality audits, preventative maintenance, design reviews etc.	Y	N	D
(ii)	appraisal costs - used to determine conformance to requirements or specification.	Y	N	D
(iii)	failure costs - cost incurred as a result of things not conforming to requirements the first time.	Y	N	D

3.	Is there a target or cost of quality reducing goal?	Y	N	D

THANK YOU VERY MUCH FOR COMPLETING THIS QUESTIONNAIRE. PLEASE REMEMBER TO PLACE IT IN THE ENVELOPE AND TO HAND IT IN TO THE DESIGNATED MANAGER

Appendix R: Extraneous Variables

The need to control extraneous variables has been made clear in chapter six. Some extraneous variables are (Malhotra, 1993, pp.225-228):

- History – refers to specific events that are external to the research and occur at the same time. In attempt to minimise this, the entire study was completed in four months (two months of interviews and two months of questionnaire collection). To the knowledge of the author, no major activities that could affect the study occurred.
- Maturation – is similar to history except that it refers to changes in the respondents themselves caused by the passage of time. In research involving people, maturation takes place as people become older, more experienced, tired, bored, or uninterested. To combat this, the length of the questionnaire was kept to the minimum possible, management themselves were asked to push the issue internally within the organisation as an apparent directive from higher authority, and a covering letter was given to each respondent indicating the importance of quality within the workplace for a business.
- Testing Effects – these are the effects on the study by taking a measure on the dependant variable before and after the presentation of the treatment. This research is cross sectional (see section six) and so this variable does not exist.
- Instrumentation – refers to changes in the measuring instruments, in the observers, or in the scores themselves. The questionnaire was never altered throughout the study and the study did not make use of any observers, so there was no variation in the responses obtained.
- Statistical Regression – occurs when obtained results with extreme scores move closer to the average score during the course of the research. Once again, this was not a longitudinal study (see section six) and does not make use of different scenarios. The results are obtained once and not manipulated to form any type of average.
- Selection Bias – refers to improper assignment of respondents to TQM conditions. To minimise this, the representative most qualified with regards to quality was interviewed (convenience sampling). Management was also asked

to distribute the questionnaires to employees in different departments within the organisation as discussed in section three (random sampling).

- Mortality – refers to the loss of respondents while the research is in progress. This happens for many reasons, such as respondents refusing to continue in the research. To combat this, meetings were held with the organisations to discuss the importance and implications of the study. This made them understand it is for their benefit, too. Furthermore, respondents were only asked 15 minutes of their time and because of the cross-sectional nature of the study, once the questionnaire was completed, they could not in essence abandon the research.

Appendix S: TQM Section Results

For the dichotomous questions, each organisation and question was counted separately for each individual section. This appendix presents the tables of answers.

Dichotomous Question Results

	Section								
Company	A	B	C	D	E	F	G	H	**Total Score**
A	1.67	3.33	1.17	5.36	6.94	11.21	1.88	0.00	**31.56**
B	13.19	4.72	2.17	7.50	8.75	8.94	3.83	0.83	**49.93**
C	5.00	1.67	1.50	7.14	6.94	8.48	2.50	0.13	**33.36**
D	3.33	4.17	0.50	5.54	5.69	8.03	2.34	0.38	**29.98**
E	12.92	4.58	2.33	7.50	7.50	9.55	2.66	0.96	**48.00**
F	4.44	2.41	1.67	7.62	5.93	7.88	2.60	0.00	**32.55**
G	4.72	2.08	1.75	8.21	3.47	9.24	2.03	0.13	**31.63**
H	6.11	4.07	0.67	6.43	3.89	10.10	1.77	1.44	**34.48**
I	13.79	3.33	2.64	9.16	8.33	8.93	5.11	0.41	**51.70**
J	3.33	6.67	3.00	4.29	6.67	12.73	5.63	0.00	**42.32**

Section A:

Company	**Response**	**Q1**	**Q2.1**	**Q2.2**	**Q2.3**	**Q2.4**	**Q2.5**	**Q3**	**Q4**	**Q5**	**Section A**
											20.00
A	Yes	0	0	0	0	0	0	4	0	0	1.67
	Don't Know	4	3	0	0	0	0	0	0	2	
	No	2	3	0	0	0	0	2	6	4	
B	Yes	9	12	10	6	10	12	12	12	12	13.19
	Don't Know	3	0	2	6	2	0	0	0	0	
	No	0	0	0	0	0	0	0	0	0	
C	Yes	1	4	1	3	2	2	7	7	7	5.00
	Don't Know	9	6	2	1	2	2	3	2	4	
	No	2	2	1	0	0	0	2	3	1	
D	Yes	1	0	0	0	0	0	2	7	5	3.33
	Don't Know	2	3	0	0	0	0	3	0	0	
	No	9	9	0	0	0	0	7	5	7	
E	Yes	12	12	9	11	10	10	11	9	9	12.92
	Don't Know	0	0	3	1	1	1	0	0	1	
	No	0	0	0	0	1	1	1	3	2	
F	Yes	0	0	0	0	0	0	6	6	3	4.44
	Don't Know	0	0	0	0	0	0	0	0	0	
	No	9	9	0	0	0	0	3	3	6	
G	Yes	2	3	2	1	0	0	5	5	10	4.72
	Don't Know	4	6	0	0	1	1	0	0	0	
	No	6	3	1	2	2	2	7	7	2	
H	Yes	0	2	0	0	2	2	9	4	9	6.11
	Don't Know	4	0	2	2	0	0	0	3	0	
	No	5	7	0	0	0	0	0	2	0	
	Yes	10	11	11	11	10	10	10	9	9	13.79

I	Don't Know	1	0	0	0	0	0	0	1	0	
	No	0	0	0	0	1	1	1	1	2	
J	Yes	0	0	0	0	0	0	0	0	1	3.33
	Don't Know	0	0	0	0	0	0	0	0	0	
	No	1	1	0	0	0	0	1	1	0	

Section B:

Company	Response	Q1	Q2	Q3	Q4.1	Q4.2	Section B
							10
A	Yes	2	0	0	5	5	3.33
	Don't Know	2	4	4	1	0	
	No	2	2	2	0	0	
B	Yes	8	5	5	8	8	4.72
	Don't Know	4	5	2	4	0	
	No	0	2	5	0	0	
C	Yes	5	1	2	3	1	1.67
	Don't Know	7	11	10	6	1	
	No	0	0	0	3	1	
D	Yes	10	2	7	6	5	4.17
	Don't Know	2	2	3	4	1	
	No	0	8	2	2	0	
E	Yes	9	3	5	8	8	4.58
	Don't Know	2	4	3	4	0	
	No	1	5	4	0	0	
F	Yes	7	3	3	0	0	2.41
	Don't Know	0	0	2	2	0	
	No	2	6	4	7	0	
G	Yes	0	3	2	8	2	2.08
	Don't Know	7	2	7	2	3	
	No	5	7	3	2	3	
H	Yes	2	0	4	9	7	4.07
	Don't Know	3	5	3	0	2	
	No	4	4	2	0	0	
I	Yes	6	3	2	7	4	3.33
	Don't Know	3	5	8	3	3	
	No	2	3	1	1	0	
J	Yes	1	1	1	1	0	6.67
	Don't Know	0	0	0	0	0	
	No	0	0	0	0	1	

Section C:

Company	Response	Q1	Q2.1	Q2.2	Section C
					10
A	Yes	2	5	0	1.17
	Don't Know	1	0	0	
	No	3	1	5	
B	Yes	10	8	8	2.17
	Don't Know	2	4	0	
	No	0	0	0	
C	Yes	2	8	8	1.50
	Don't Know	6	1	0	

	No	4	3	0	
D	Yes	1	4	1	0.50
	Don't Know	1	0	3	
	No	10	8	0	
E	Yes	10	9	9	2.33
	Don't Know	1	1	0	
	No	1	2	0	
F	Yes	2	9	4	1.67
	Don't Know	0	0	0	
	No	7	0	5	
G	Yes	3	10	8	1.75
	Don't Know	2	0	0	
	No	7	2	2	
H	Yes	2	4	0	0.67
	Don't Know	0	3	0	
	No	7	2	4	
I	Yes	8	11	10	2.64
	Don't Know	0	0	0	
	No	3	0	1	
J	Yes	1	1	1	3.00
	Don't Know	0	0	0	
	No	0	0	0	

Section D:

Company	Response	Q1	Q2	Q3	Q4	Q4.1	Q5	Q6	Section D
									15.00
A	Yes	6	0	0	3	2	4	0	5.36
	Don't Know	0	0	0	0	0	0	6	
	No	0	6	6	3	1	2	0	
B	Yes	9	2	2	7	7	5	10	7.50
	Don't Know	0	3	0	0	0	0	2	
	No	3	7	10	5	0	7	0	
C	Yes	11	5	6	6	3	4	5	7.14
	Don't Know	1	4	1	0	1	2	7	
	No	0	3	5	6	2	6	0	
D	Yes	3	4	3	7	5	3	6	5.54
	Don't Know	1	0	0	0	2	0	2	
	No	8	8	9	5	0	9	4	
E	Yes	8	2	6	10	7	2	7	7.50
	Don't Know	1	1	0	1	0	1	3	
	No	3	9	6	1	3	9	2	
F	Yes	7	6	4	5	1	3	6	7.62
	Don't Know	0	0	0	0	0	0	0	
	No	2	3	5	4	4	6	3	
G	Yes	9	5	3	12	4	4	9	8.21
	Don't Know	0	2	2	0	2	2	0	
	No	3	5	7	0	6	6	3	
H	Yes	7	0	2	6	4	2	6	6.43
	Don't Know	0	2	0	0	0	3	3	
	No	2	7	7	3	2	4	0	

I	Yes	11	2	5	11	10	0	8	9.16
	Don't Know	0	1	0	0	0	2	3	
	No	0	8	6	0	1	9	0	
J	Yes	1	0	0	1	0	0	0	4.29
	Don't Know	0	0	0	0	0	0	1	
	No	0	1	1	0	1	1	0	

Section E:

Company	Response	Q2	Q3	Q4	Q5	Q6	Q6.1	Q8	Section E
									15.00
A	Yes	0	3	5	0	6	6	5	6.94
	Don't Know	1	0	1	3	0	0	1	
	No	5	3	0	3	0	0	0	
B	Yes	8	9	7	6	12	12	9	8.75
	Don't Know	4	2	4	4	0	0	0	
	No	0	1	1	2	0	0	3	
C	Yes	1	8	9	7	11	8	6	6.94
	Don't Know	6	2	3	4	1	3	4	
	No	5	2	0	1	0	1	2	
D	Yes	0	7	12	2	10	3	7	5.69
	Don't Know	2	0	0	4	0	8	2	
	No	10	5	0	6	2	1	3	
E	Yes	4	8	10	9	8	9	6	7.50
	Don't Know	4	2	1	1	3	3	5	
	No	4	2	1	2	1	0	1	
F	Yes	3	3	4	5	6	4	7	5.93
	Don't Know	0	0	0	0	0	3	2	
	No	6	6	5	4	3	2	0	
G	Yes	0	3	2	4	8	5	3	3.47
	Don't Know	2	0	2	2	2	2	6	
	No	10	9	8	6	2	5	3	
H	Yes	0	0	7	2	0	3	9	3.89
	Don't Know	2	2	2	2	0	0	0	
	No	7	7	0	5	9	6	0	
I	Yes	4	10	10	11	4	10	6	8.33
	Don't Know	4	0	0	0	5	0	3	
	No	3	1	1	0	2	1	2	
J	Yes	0	1	1	0	0	1	1	6.67
	Don't Know	0	0	0	0	0	0	0	
	No	1	0	0	1	1	0	0	

Section F:

Company	Response	Q2	Q3	Q5.1	Q5.2	Q5.3	Q7.1	Q7.2	Section F
									20.00
A	Yes	6	6	4	6	0	6	5	15.71
	Don't Know	0	0	2	0	2	0	0	
	No	0	0	0	0	4	0	1	
B	Yes	10	12	5	7	5	12	12	15.00
	Don't Know	2	0	3	2	6	0	0	
	No	0	0	4	3	1	0	0	
	Yes	8	10	8	12	0	10	3	12.14

C	Don't Know	3	2	2	0	7	2	9	
	No	1	0	2	0	5	0	0	
D	Yes	11	9	8	12	1	6	6	12.62
	Don't Know	0	0	0	0	10	4	4	
	No	1	3	4	0	1	2	2	
E	Yes	10	11	8	10	0	9	7	13.10
	Don't Know	0	0	2	2	4	3	3	
	No	2	1	2	0	8	0	2	
F	Yes	6	5	9	9	1	4	1	11.11
	Don't Know	3	2	0	0	3	3	6	
	No	0	2	0	0	5	2	2	
G	Yes	7	8	12	12	0	11	5	13.10
	Don't Know	2	4	0	0	6	0	4	
	No	3	0	0	0	6	1	3	
H	Yes	7	9	7	9	0	7	5	13.97
	Don't Know	0	0	0	0	3	2	2	
	No	2	0	2	0	6	0	2	
I	Yes	11	11	11	10	1	8	2	14.03
	Don't Know	0	0	0	1	9	3	4	
	No	0	0	0	0	1	0	5	
J	Yes	1	1	1	1	0	1	1	17.14
	Don't Know	0	0	0	0	0	0	0	
	No	0	0	0	0	1	0	0	

Section G:

Company	Response	Q1	Q3	Q4	Q5	Q6	Q6.1	Q6.2	Section G
									7.50
A	Yes	1	1	1	4	4	1	0	1.88
	Don't Know	4	0	0	2	2	2	2	
	No	1	5	0	0	0	3	4	
B	Yes	9	8	8	7	7	5	5	3.83
	Don't Know	2	0	0	2	2	4	5	
	No	1	4	0	3	3	3	2	
C	Yes	4	3	2	3	8	8	4	2.50
	Don't Know	5	0	1	3	2	4	5	
	No	3	9	0	6	2	0	3	
D	Yes	1	4	2	11	5	5	2	2.34
	Don't Know	0	0	1	0	3	7	7	
	No	11	8	1	1	4	0	3	
E	Yes	5	4	3	7	7	5	3	2.66
	Don't Know	4	2	0	2	2	6	7	
	No	3	6	1	3	3	1	2	
F	Yes	4	6	4	7	2	2	0	2.60
	Don't Know	1	3	0	0	3	6	6	
	No	4	0	2	2	4	1	3	
G	Yes	0	0	0	10	8	8	0	2.03
	Don't Know	5	0	0	0	0	4	5	
	No	7	12	0	2	4	0	7	
H	Yes	2	0	0	4	5	4	2	1.77
	Don't Know	3	0	0	0	0	5	5	

	No	4	9	0	5	4	0	2	
I	Yes	10	7	7	11	10	8	7	5.11
	Don't Know	0	0	0	0	0	0	0	
	No	1	4	0	0	1	3	4	
J	Yes	0	1	1	1	1	1	1	5.63
	Don't Know	0	0	0	0	0	0	0	
	No	1	0	0	0	0	0	0	

Section H:

Company	Response	Q1	Q2.1	Q2.2	Q2.3	Q3	Section H
							2.50
A	Yes	0	0	0	0	0	0.00
	Don't Know	6	0	0	0	0	
	No	0	0	0	0	0	
B	Yes	6	5	4	3	2	0.83
	Don't Know	4	1	2	2	2	
	No	2	0	0	1	2	
C	Yes	1	1	1	0	0	0.13
	Don't Know	10	0	0	0	1	
	No	1	0	0	1	0	
D	Yes	3	2	3	1	0	0.38
	Don't Know	1	0	0	1	2	
	No	8	1	0	1	1	
E	Yes	6	4	5	4	4	0.96
	Don't Know	5	1	0	0	0	
	No	1	1	1	2	2	
F	Yes	0	0	0	0	0	0.00
	Don't Know	2	0	0	0	0	
	No	7	0	0	0	0	
G	Yes	1	0	1	1	0	0.13
	Don't Know	9	1	0	0	1	
	No	2	0	0	0	0	
H	Yes	6	6	4	6	4	1.44
	Don't Know	3	0	0	0	0	
	No	0	0	2	0	2	
I	Yes	2	2	2	2	1	0.41
	Don't Know	6	0	0	0	1	
	No	3	0	0	0	0	
J	Yes	0	0	0	0	0	0.00
	Don't Know	0	0	0	0	0	
	No	1	0	0	0	0	

Itemised Question Results:

Company	Sections						
		A	B	C	E	F	G
	A	1.25	0.56	-0.17	0.83	2.88	-0.16
	B	2.71	0.69	3.88	2.29	4.17	0.43
	C	1.53	0.21	2.08	1.53	3.11	-0.16
	D	0.63	0.14	0.13	0.90	2.12	-0.47
	E	1.67	0.69	2.63	1.46	2.65	0.04
	F	1.30	0.19	1.06	0.37	0.91	-0.57
	G	-0.14	-0.07	1.04	0.14	0.76	-0.31
	H	1.20	0.56	2.89	0.00	2.93	-0.36
	I	2.73	0.38	2.95	1.74	3.14	0.00
	J	2.50	1.67	4.00	0.83	7.27	0.00

Appendix T: Source Data for Financial Indicators

This appendix shows the figures used to calculate the six financial indicators. It does not show the original values from the balance sheets and income statements to keep the anonymity of the organisations. It only shows the calculated figures from the original data and the final percentage increases.

Calculated Figures:

2005	2004	2003	2002	2001	2000
CALCULATED FIGURES					
Sales					
34.47	74.97	44.66	-29.29	7.15	
43.90	19.00	16.53	21.41	-2.42	
12.55	49.93	41.59	22.48	30.92	
6.34	7.75	11.39	1.27	16.31	
9.62	-9.80	5.30	32.84	37.00	
14.42	-13.49	46.11	-33.84	139.36	
11.58	-14.19	29.62	206.76	-36.87	
-33.60	41.00	-75.42	-43.36	-42.95	
0.15	4.09	-0.08	0.00	0.00	
13.80	18.27	-3.98	-11.09	24.48	
Return on Sales					
49.46 **0.4045** 5.24	**0.2706** 3.58	**0.2572** 24.19	**0.2483** -2.98	**0.1999**	**0.2060**
29.94 **0.0526** -2.58	**0.0405** 18.92	**0.0416** 71.56	**0.0349** -55.01	**0.0204**	**0.0453**
38.79 **0.0763** -8.40	**0.0550** 37.98	**0.0600** -69.71	**0.0435** -25.63	**0.1436**	**0.1931**
-1.96 **0.2146** -5.97	**0.2189** -3.11	**0.2328** -1.81	**0.2403** -3.84	**0.2447**	**0.2545**
26.38 **0.0536** -40.98	**0.0424** 0.18	**0.0719** 40.02	**0.0717** 39.36	**0.0512**	**0.0368**
5.23 **0.1482** -6.56	**0.1409** 132.48	**0.1508** -327.70	**-0.4642** -24.28	**0.2039**	**0.2692**
9.72 **0.0778** 29.44	**0.0709** -18.75	**0.0548** 187.19	**0.0674** 5.22	**-0.0773**	**-0.0816**
101.32 **0.0100** 85.07	**-0.7551** -484.41	**-5.0561** -21.53	**-0.8652** -321.17	**-0.7119**	**0.3219**
43.18 **0.0641** -14.95	**0.0447** -9.88	**0.0526** -23.77	**0.0584** -26.93	**0.0766**	**0.1048**
519.69 **0.0247** 96.86	**-0.0059** 84.13	**-0.1874** -61.91	**-1.1812** 1710.17	**-0.7295**	**-0.0403**
Return on Assets (ROA)					
0.25	0.09	0.13	0.15	0.14	0.15
0.08	0.07	0.04	0.04	0.00	0.03
0.10	0.08	0.06	0.08	0.14	0.17
0.15	0.14	0.17	0.15	0.17	0.17
0.06	0.05	0.08	0.07	0.06	0.08
0.11	0.13	0.13	-1.40	0.12	0.21
-0.06	-0.03	0.02	0.03	-0.09	-0.66
0.02	-1.23	-3.07	-1.53	-0.18	0.12
0.13	0.06	0.08	-0.05	0.05	0.03
0.01	-0.03	-0.35	-1.63	-0.37	-0.03
Total Asset Turnover					
0.97	0.86	0.76	0.92	1.23	1.37
2.61	2.55	2.53	1.98	2.10	1.84
1.47	1.43	0.98	1.05	0.86	0.70
0.98	0.82	0.88	0.87	0.92	0.78
1.74	1.87	2.12	2.32	2.13	1.84
1.62	1.42	1.75	1.00	0.66	0.71
2.07	2.01	1.91	1.61	0.61	4.94
0.92	1.77	0.69	0.60	0.32	0.55
1.23	1.36	1.93	0.85	0.43	0.46
1.90	2.01	1.77	1.38	0.52	0.34
Return on Equity (ROE)					
0.33	0.14	0.19	0.20	0.18	0.23
0.21	0.14	0.09	0.09	0.00	0.08
0.15	0.12	0.11	0.10	0.16	0.20
0.17	0.17	0.20	0.18	0.20	0.19

0.19	0.16	0.25	0.24	0.17	0.23
0.22	0.20	0.23	-5.08	0.19	0.84
-0.22	-0.08	0.05	0.09	-0.24	3.69
0.18	-16.53	-4.30	-1.87	-0.21	0.19
0.25	0.12	0.19	-0.08	0.10	0.06
0.06	-0.13	-1.35	-4.04	-0.53	-0.04

Share Price

200.00%	-42.86%	133.33%	-25.00%	-72.41%
234.15%	64.00%	78.57%	133.33%	-53.85%
11.11%	50.00%	35.48%	-27.06%	-42.18%
99.34%	-7.93%	18.84%	21.05%	-8.06%
16.63%	19.60%	65.24%	65.35%	11.89%
61.11%	9.09%	200.00%	-95.20%	-68.02%
60.61%	54.73%	13.24%	10.25%	-21.46%
966.67%	0.00%	200.00%	-85.71%	-73.08%
68.84%	0.00%	0.00%	0.00%	0.00%
16.26%	17.52%	13.36%	-71.50%	-85.58%

Final Percentage Change Figures:

2005	2004	2003	2002	2001			FINAL
FINAL PERCENTAGE CHANGE FIGURES							
Percentage Change in Sales							
17.24	18.74	5.58	-1.83	0.45	**40.18**	A	**40.18**
21.95	4.75	2.07	1.34	-0.15	**29.95**	B	**29.95**
6.27	12.48	5.20	1.41	1.93	**27.29**	C	**27.29**
3.17	1.94	1.42	0.08	1.02	**7.63**	D	**7.63**
4.81	-2.45	0.66	2.05	2.31	**7.39**	E	**7.39**
7.21	-3.37	5.76	-2.11	8.71	**16.20**	F	**16.20**
5.79	-3.55	3.70	12.92	-2.30	**16.56**	G	**16.56**
-16.80	10.25	-9.43	-2.71	-2.68	**-21.37**	H	**-21.37**
0.08	1.02	-0.01	0.00	0.00	**1.09**	I	**1.09**
6.90	4.57	-0.50	-0.69	1.53	**11.81**	J	**11.81**
Percentage Change in Return on Sales							
24.73	1.31	0.45	1.51	-0.19	**27.81**	A	**27.81**
14.97	-0.65	2.37	4.47	-3.44	**17.72**	B	**17.72**
19.40	-2.10	4.75	-4.36	-1.60	**16.09**	C	**16.09**
-0.98	-1.49	-0.39	-0.11	-0.24	**-3.22**	D	**-3.22**
13.19	-10.25	0.02	2.50	2.46	**7.93**	E	**7.93**
2.62	-1.64	16.56	-20.48	-1.52	**-4.46**	F	**-4.46**
4.86	7.36	-2.34	11.70	0.33	**21.90**	G	**21.90**
50.66	21.27	-60.55	-1.35	-20.07	**-10.04**	H	**-10.04**
21.59	-3.74	-1.23	-1.49	-1.68	**13.45**	I	**13.45**
259.84	24.22	10.52	-3.87	106.89	**397.59**	J	**0.00**
Percentage Change in Return on Assets							
0.12	0.02	0.02	0.01	0.01	**0.18**	A	**18.00**
0.04	0.02	0.01	0.00	0.00	**0.06**	B	**6.00**
0.05	0.02	0.01	0.01	0.01	**0.09**	C	**9.00**
0.08	0.03	0.02	0.01	0.01	**0.15**	D	**15.00**
0.03	0.01	0.01	0.00	0.00	**0.06**	E	**6.00**
0.05	0.03	0.02	-0.09	0.01	**0.02**	F	**2.00**
-0.03	-0.01	0.00	0.00	-0.01	**-0.04**	G	**0.00**
0.01	-0.31	-0.38	-0.10	-0.01	**-0.79**	H	**0.00**
0.06	0.01	0.01	0.00	0.00	**0.09**	I	**9.00**
0.01	-0.01	-0.04	-0.10	-0.02	**-0.17**	J	**0.00**
Percentage Change in Total Asset Turnover							
0.48	0.21	0.10	0.06	0.08	**0.93**	A	**0.93**
1.31	0.64	0.32	0.12	0.13	**2.52**	B	**2.52**
0.73	0.36	0.12	0.07	0.05	**1.33**	C	**1.33**
0.49	0.20	0.11	0.05	0.06	**0.92**	D	**0.92**
0.87	0.47	0.27	0.15	0.13	**1.88**	E	**1.88**
0.81	0.35	0.22	0.06	0.04	**1.49**	F	**1.49**
1.03	0.50	0.24	0.10	0.04	**1.91**	G	**1.91**
0.46	0.44	0.09	0.04	0.02	**1.05**	H	**1.05**
0.62	0.34	0.24	0.05	0.03	**1.28**	I	**1.28**

0.95	0.50	0.22	0.09	0.03	**1.79**	J	**1.79**

Percentage Change in Return on Equity

0.16	0.03	0.02	0.01	0.01	**0.24**	A	**24.00**
0.11	0.03	0.01	0.01	0.00	**0.16**	B	**16.00**
0.08	0.03	0.01	0.01	0.01	**0.14**	C	**14.00**
0.09	0.04	0.03	0.01	0.01	**0.18**	D	**18.00**
0.09	0.04	0.03	0.02	0.01	**0.19**	E	**19.00**
0.11	0.05	0.03	-0.32	0.01	**-0.12**	F	**0.00**
-0.11	-0.02	0.01	0.01	-0.01	**-0.13**	G	**0.00**
0.09	-4.13	-0.54	-0.12	-0.01	**-4.71**	H	**0.00**
0.12	0.03	0.02	-0.01	0.01	**0.18**	I	**18.00**
0.03	-0.03	-0.17	-0.25	-0.03	**-0.46**	J	**0.00**

Percentage Change in Share Price

100.00	-10.71	16.67	-1.56	-4.53	**99.86**	A	**99.86**
117.07	16.00	9.82	8.33	-3.37	**147.86**	B	**147.86**
5.56	12.50	4.44	-1.69	-2.64	**18.16**	C	**18.16**
49.67	-1.98	2.36	1.32	-0.50	**50.85**	D	**50.85**
8.31	4.90	8.15	4.08	0.74	**26.20**	E	**26.20**
30.56	2.27	25.00	-5.95	-4.25	**47.63**	F	**47.63**
30.31	13.68	1.65	0.64	-1.34	**44.94**	G	**44.94**
483.33	0.00	25.00	-5.36	-4.57	**498.41**	H	**0.00**
34.42	0.00	0.00	0.00	0.00	**34.42**	I	**34.42**
8.13	4.38	1.67	-4.47	-5.35	**4.36**	J	**4.36**

Appendix U: Cronbach's Alpha Statistical Results

This appendix shows the results of all Cronbach's alpha statistical tests performed on the multi-item questions.

ALL SECTIONS

Scale reliability alpha = 0.837024 (95% lower confidence limit = 0.794756)

Variable dropped	Alpha	Change
Section A		
Q6	0.831632	-0.00539
Q7	0.826695	-0.01033
Q8	0.826803	-0.01022
Section B		
Q5	0.826477	-0.01055
Section C		
Q3	0.823532	-0.01349
Q4	0.835515	-0.00151
Q5	0.823777	-0.01325
Q6	0.818468	-0.01856
Q7	0.821467	-0.01556
Q8	0.847946	**0.010922**
Q9	0.815921	-0.0211
Section D		
Q4.2	0.846484	**0.009459**
Section E		
Q7	0.845267	**0.008243**
Q9	0.824317	-0.01271
Section F		
Q1	0.831364	-0.00566
Q4	0.824106	-0.01292
Q6	0.834135	-0.00289
Q8	0.829565	-0.00746
Section G		
Q2	0.821309	-0.01572

Section A

Scale reliability alpha = 0.575784 (95% lower confidence limit = 0.435789)

Variable dropped	Alpha	Change
Q6	0.417291	-0.15849
Q7	0.396456	-0.17933
Q8	0.589193	0.013409

Sections A and B

Scale reliability alpha = 0.595229 (95% lower confidence limit = 0.472084)

Variable dropped	Alpha	Change
Q6	0.485661	-0.10957
Q7	0.481293	-0.11394
Q8	0.543237	-0.05199
Q5	0.575784	-0.01945

Sections A and E

Scale reliability alpha = 0.539922 (95% lower confidence limit = 0.406016)

Variable dropped	Alpha	Change
Q6	0.453496	-0.08643
Q7	0.392129	-0.14779
Q8	0.443485	-0.09644
Q7	0.568511	0.028588
Q9	0.556277	0.016355

Sections A, B, and D

Scale reliability alpha = 0.522833 (95% lower confidence limit = 0.383952)

Variable dropped	Alpha	Change
Q6	0.45605	-0.06678
Q7	0.388978	-0.13385
Q8	0.431638	-0.09119
Q5	0.453155	-0.06968
Q4.2	0.595229	0.072397

Sections D and E

Scale reliability alpha = 0.182232 (95% lower confidence limit = 0)

Variable dropped	Alpha	Change
Q4.2	0.061541	-0.12069
Q7	-0.03362	-0.21585
Q9	0.278469	0.096237

Sections B, D, and G

Scale reliability alpha = 0.376533 (95% lower confidence limit = 0.170782)

Variable dropped	Alpha	Change
Q5	0.196991	-0.17954
Q4.2	0.422296	0.045763
Q2	0.239917	-0.13662

Sections B, D, E, and G

Scale reliability alpha = 0.482747 (95% lower confidence limit = 0.332199)

Variable dropped	Alpha	Change	
Q5	0.383403	-0.09934	
Q4.2	0.482854	0.000107	
Q2	0.327852	-0.15489	
Q7	0.486602	0.003855	
Q9	0.43846	-0.04429	

Sections A, B, D, and G

Scale reliability alpha = 0.61241 (95% lower confidence limit = 0.502708)

Variable dropped	Alpha	Change	
Q6	0.564594	-0.04782	
Q7	0.506926	-0.10548	
Q8	0.570803	-0.04161	
Q5	0.564413	-0.048	
Q4.2	0.658701	0.046291	
Q2	0.522833	-0.08958	

Section C

Scale reliability alpha = 0.756113 (95% lower confidence limit = 0.6884)

Variable dropped	Alpha	Change	
Q3	0.741634	-0.01448	
Q4	0.749256	-0.00686	
Q5	0.734594	-0.02152	
Q6	0.703287	-0.05283	
Q7	0.677738	-0.07838	
Q8	0.787358	0.031245	
Q9	0.67122	-0.08489	

Section E

Scale reliability alpha = 0.061541 (95% lower confidence limit = 0)

Variable dropped	Alpha	Change	
Q7	*	*	*
Q9	*	*	*

Section F

Scale reliability alpha = 0.53891 (95% lower confidence limit = 0.39863)

Variable dropped	Alpha	Change	
Q1	0.395772	-0.14314	
Q4	0.511918	-0.02699	
Q6	0.497514	-0.0414	

Q8	0.458346	-0.08056

Sections F and G

Scale reliability alpha = 0.601856 (95% lower confidence limit = 0.485974)

Variable dropped	Alpha	Change
Q1	0.554741	-0.04712
Q4	0.52331	-0.07855
Q6	0.580304	-0.02155
Q8	0.530782	-0.07107
Q2	0.53891	-0.06295

Appendix V: Chi-Square Statistical Results

This appendix shows the chi-square results for the dichotomous questions in the various sections of the questionnaire. The P value in chi-square answers this question: If there is really no association between the variable that defines the rows and the variable that defines the columns, then what is the chance that random sampling would result in a chi-square value as large (or larger) as obtained in the experiment. A P value lower than 0.001 indicates statistical significance and dependence on each other.

Chi-squared Test for Independence - All Sections

Chi-square: 1052.6
Degrees of Freedom: 94

Table size: 48 rows, 3 columns.
The P value is < 0.0001.
The row and column variables are significantly associated.

Section	Question	Row	Total	Percent
A	2.1	1	96	2.42%
	2.2	2	44	1.11%
	2.3	3	44	1.11%
	2.4	4	44	1.11%
	2.5	5	44	1.11%
	3	6	96	2.42%
	4	7	96	2.42%
	5	8	96	2.42%
B	1	9	96	2.42%
	2	10	96	2.42%
	3	11	96	2.42%
	4.1	12	96	2.42%
	4.2	13	55	1.39%
C	1	14	96	2.42%
	2.1	15	69	1.74%
D	1	16	96	2.42%
	2	17	96	2.42%
	3	18	96	2.42%
	4	19	96	2.42%
	4.1	20	68	1.72%
	5	21	96	2.42%
	6	22	96	2.42%
E	2	23	96	2.42%
	3	24	96	2.42%

	4	25	96	2.42%
	5	26	96	2.42%
	6	27	96	2.42%
	6.1	28	96	2.42%
	8	29	96	2.42%
	2	30	96	2.42%
	3	31	96	2.42%
	5.1	32	96	2.42%
F	5.2	33	96	2.42%
	5.3	34	96	2.42%
	7.1	35	96	2.42%
	7.2	36	96	2.42%
	1	37	96	2.42%
	3	38	96	2.42%
	4	39	34	0.86%
G	5	40	96	2.42%
	6	41	96	2.42%
	6.1	42	96	2.42%
	6.2	43	96	2.42%
	1	44	96	2.42%
	2.1	45	26	0.66%
H	2.2	46	26	0.66%
	2.3	47	26	0.66%
	3	48	26	0.66%
		Total	**3962**	**100.00%**

Section A				
Contingency table analysis				
Observed	44	18	34	96
Observed	33	9	2	44
Observed	32	10	2	44
Observed	34	6	4	44
Observed	36	4	4	44
Observed	66	6	24	96
Observed	59	6	31	96
Observed	65	7	24	96
Total	369	66	125	560
TOTAL number of cells = 24				

NOMINAL INDEPENDENCE				
Chi-square = 59.627836	DF = 14	P < 0.0001		
Section B				
Contingency table analysis				
Observed	50	30	16	96
Observed	21	38	37	96
Observed	31	42	23	96
Observed	55	26	15	96
Observed	40	10	5	55
Total	197	146	96	439
TOTAL number of cells = 15				
NOMINAL INDEPENDENCE				
Chi-square = 57.331354	DF = 8	P < 0.0001		
Section C				
Contingency table analysis				
Observed	41	13	42	96
Observed	49	3	17	69
Total	90	16	59	165
TOTAL number of cells = 6				
NOMINAL INDEPENDENCE				
Chi-square = 13.497572	DF = 2	P = 0.0012		
Section D				
Contingency table analysis				
Observed	72	3	21	96
Observed	26	13	57	96
Observed	31	3	62	96
Observed	68	1	27	96

Observed	43	5	20	68
Observed	27	10	59	96
Observed	57	27	12	96
Total	324	62	258	644

TOTAL number of cells = 21

NOMINAL INDEPENDENCE
Chi-square = 167.019283 DF = 12 P < 0.0001

Section E

Contingency table analysis

Observed	20	25	51	96
Observed	52	8	36	96
Observed	67	13	16	96
Observed	46	20	30	96
Observed	65	11	20	96
Observed	61	19	16	96
Observed	59	23	14	96
Total	370	119	183	672

TOTAL number of cells = 21

NOMINAL INDEPENDENCE
Chi-square = 87.215175 DF = 12 P < 0.0001

Section F

Contingency table analysis

Observed	77	10	9	96
Observed	82	8	6	96
Observed	73	9	14	96
Observed	88	5	3	96
Observed	38	50	8	96

Observed	74	17	5	96
Observed	47	32	17	96
Total	479	131	62	672

TOTAL number of cells = 21

NOMINAL INDEPENDENCE
Chi-square = 134.571087 DF = 12 P < 0.0001

Section G

Contingency table analysis

Observed	36	24	36	96
Observed	34	5	57	96
Observed	28	2	4	34
Observed	65	9	22	96
Observed	57	14	25	96
Observed	47	38	11	96
Observed	24	42	30	96
Total	291	134	185	610

TOTAL number of cells = 21

NOMINAL INDEPENDENCE
Chi-square = 140.996079 DF = 12 P < 0.0001

Section H

Contingency table analysis

Observed	25	46	25	96
Observed	20	4	2	26
Observed	20	3	3	26
Observed	17	4	5	26
Observed	11	8	7	26

Total	93	65	42	200

TOTAL number of cells = 15

NOMINAL INDEPENDENCE
Chi-square = 41.266207 DF = 8 P < 0.0001

Appendix W: Simple Linear Regression

The simple linear regression in this appendix tries to ascertain if there is any link between ROE and any TQM principle. ROE is used because TQM had the largest impact on this financial indicator. The equation for ROE and each TQM principle is:

$$ROE(Dependent) = a + b(TQM\ \text{Pr}\,inciple(Independent))$$

ROE and Top Management Involvement

Regression Statistics	
Multiple R	0.119871803
R Square	0.014369249
Adjusted R Square	-0.108834595
Standard Error	159.9123377
Observations	10

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	2982.454056	2982.454056	0.116629877	0.741515955
Residual	8	204575.6459	25571.95574		
Total	9	207558.1			

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	-72.67244494	99.77197489	-0.728385351	0.487148502
X Variable 1	3.502299899	10.25530126	0.341511167	0.741515955

ROE and Information Systems

Regression Statistics	
Multiple R	0.133064659
R Square	0.017706203
Adjusted R Square	-0.105080521
Standard Error	159.6414083
Observations	10

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	3675.065928	3675.065928	0.144202913	0.71402044
Residual	8	203883.0341	25485.37926		
Total	9	207558.1			

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	1.04059167	127.2113011	0.008180025	0.993673664
X Variable 1	-10.54763578	27.77589796	-0.379740586	0.71402044

ROE and Strategic Quality Planning

Regression Statistics	
Multiple R	0.017304199
R Square	0.000299435
Adjusted R Square	-0.124663135
Standard Error	161.0496623
Observations	10

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	62.15022364	62.15022364	0.0023962	0.962158397
Residual	8	207495.9498	25936.99372		
Total	9	207558.1			

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	-38.57864384	109.070759	-0.353702901	0.732702038
X Variable 1	-1.246321703	25.46059967	-0.048950996	0.962158397

ROE and Human Resource Development

Regression Statistics	
Multiple R	0.153884944
R Square	0.023680576
Adjusted R Square	-0.098359352
Standard Error	159.1551934
Observations	10

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	4915.095338	4915.095338	0.194039576	0.671235497
Residual	8	202643.0047	25330.37558		
Total	9	207558.1			

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	-152.8217089	253.6737039	-0.602434176	0.563566972
X Variable 1	15.93043038	36.16449046	0.440499235	0.671235497

ROE and Management of Process Quality

Regression Statistics	
Multiple R	0.564158731
R Square	0.318275073
Adjusted R Square	0.233059458
Standard Error	132.9932002
Observations	10

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	66060.5695	66060.5695	3.734938371	0.089361523
Residual	8	141497.5305	17687.19131		
Total	9	207558.1			

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	-306.1090897	142.342163	-2.150515934	0.063724048
X Variable 1	35.41476419	18.32494308	1.932598864	0.089361523

ROE and Customer Focus and Satisfaction

Regression Statistics	
Multiple R	0.127008972
R Square	0.016131279
Adjusted R Square	-0.106852311
Standard Error	159.7693347
Observations	10

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	3348.177607	3348.177607	0.131166109	0.72660645
Residual	8	204209.9224	25526.2403		
Total	9	207558.1			

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	34.65406181	221.0925993	0.156740035	0.879333146
X Variable 1	-6.235156469	17.21616988	-0.362168619	0.72660645

ROE and Management Structure and Teams

Regression Statistics	
Multiple R	0.284055308
R Square	0.080687418
Adjusted R Square	-0.034226654
Standard Error	154.4388118
Observations	10

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	16747.32722	16747.32722	0.702154369	0.426385218
Residual	8	190810.7728	23851.3466		
Total	9	207558.1			

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	-123.8944415	107.8698204	-1.148555185	0.283920195
X Variable 1	27.99633227	33.41064331	0.837946519	0.426385218

ROE and Cost of Quality

Regression Statistics	
Multiple R	0.661779346
R Square	0.437951903
Adjusted R Square	0.367695891
Standard Error	120.7567985
Observations	10

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	90900.4649	90900.4649	6.233657305	0.037130794
Residual	8	116657.6351	14582.20439		
Total	9	207558.1			

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	43.72773088	51.70309063	0.845746944	0.422267706
X Variable 1	-203.3358198	81.44087469	-2.496729322	0.037130794

Appendix X: Overview of Company Results

Company A

Company A came in at seventh out of the ten organisations with a score of only 36.75. This is surprising since it has such positive results, from a financial aspect. The organisation performs well in two TQM principles – Management of Process Quality and Customer Focus and Satisfaction. Financially, Company A came top in ROE, ROA, percentage change in sales, and percentage change in return on sales and second in percentage increase in share price.

Company B

This is the top performer regarding its quality score. It obtained 64.10; almost double that of Company A, the highest performer regarding its financial indicators. Company B does, however, excel in the financial performance too. It is in the top five for all the financial indicators, coming first for percentage increase in share price and total asset turnover. With management commitment and drive, it is attributable coming in at second after Company I.

Company C

The average score for the IT organisations is 46.50. Company C and H are approximately on this average. Four organisations are higher and four are lower, with regards to quality practices in place. Company C's top quality practice collaborated with Company A's - Management of Process Quality and Customer Focus and Satisfaction. Company C is also in the top five regarding the financial aspects, except share price increase and return on equity.

Company D

Company D is second lowest. It is the lowest performer in quality planning and second lowest in human resource development and involvement of top management. From this, it may indicate a non-healthy work environment with no consideration of quality, as there is no drive from management and no quality planning. Company D performs poorly in the sales results (change in sales and change in return on sales) but performs better in ROA and ROE. It is also third for increase in share price.

Company E

If Company J's results are ignored due to the lack of participation, Company E is third highest, with its TQM results, with a score of 57.14. Company E shows above average results in involvement of top management, information systems, and management of quality. Financially, it scores highly in ROE and total asset turnover. The financial results are not low in any other particular financial indicators but fail to excel in others.

Company F

Company F obtains third lowest with a score of 35.79. The lowest four organisations have similar results ranging between 33 and 37. Company F has the worst result for customer focus and satisfaction and shows a definite lack of commitment from management. Company F has, overall, lower results than most except in total asset turnover and percentage share in sales. It does, however, obtain negative results for percentage change in return on sales and ROE.

Company G

This is the lowest performing organisation obtaining a score of 33.05. This is not reflected in the financial indicators, as some results seem average. It came second for percentage change in return on sales and total asset turnover, however, obtained negative results for ROA and ROE.

Company H

Company H is the second organisation with the average TQM score. The reason for this is the poor result for management of quality, management structure and teams, and involvement and drive of management, in quality aspects. Financially, organisation H is the lowest, obtaining negative results in all financial indicators except share price and total asset turnover where it is below average.

Company I

Company I has the second highest score indicating better quality principles in place. It scores most where quality should be from – top management and employees (human

resource development). The financial indicators are mostly above average excelling in ROA and ROE but failing to make an impact on sales and share price increases.

Company J

Company J only managed to obtain one respondent. It performs well with a score of 58.59 in TQM. Financially it obtained negative and positive results.