UNIVERSITY OF KWAZULU-NATAL

TOTAL QUALITY MANAGEMENT IN AUTOMOTIVE MANUFACTURING

By

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Dedication

I dedicate this research to my son Azi Humbane.

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ABSTRACT

Total Quality Management (TQM) has become a term associated with a holistic management approach to business processes with the aim of obtaining efficiency and customer satisfaction. Today the South African automotive industry faces the challenges of globalisation which necessitates a strong focus on quality and productivity achievement. The aim of this study is to investigate the status of TQM implementation in the automotive manufacturing company based in Durban. The sample used in this research was made up of 101 fulltime management employees in two manufacturing plants. More than half (58%) of the participants had sufficient work experience (10 years and more), 36% had 6 to 10 years work experience and only 6% with less than 6 years' work experience. Most participants were from the production department (57.4%), other departments included in the survey were quality (10.9%), logistics (11.9%), maintenance (12.9%) and engineering (6.9%). Collected data was analysed by means of various statistical tools including frequencies and means, correlation tests, regression analysis and t-tests. Six TQM principles were tested and evaluated for the degree of possible implementation in the company. The results showed that there were strong relationships between empowerment & motivation and employee involvement. The study revealed that continuous improvement activities strengthened process management and that employee involvement in the automotive company was predicted by the level of their motivation. The results also found that senior management were more committed to meeting production schedules than quality objectives. It is recommended management should focus on activities that would motivate employees to own their work environment such as education and training. It is also recommended that employees be involved in decision-making and be given opportunity to use company resources in order to carryout corrective action themselves instead of that being a privilege of those in possession of company resources. The study later revealed that some TQM principles were firmly entrenched but the general management were not aware of these principles as individually constituting the right to be implemented if the company was to extract maximum quality and productivity benefits out of TQM. The study will benefit the organisation by bringing into attention the management aspects that requires improvement. The study may also become a basis for TQM framework development for the South African context.

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List of Abbreviations

APDP	Automotive Production and Development Plan
CF	Customer Focus
CI	Continuous Improvement
E&M	Empowerment & Motivation
EI	Employee Involvement
GDP	Gross Domestic Product
ISO	International Organisation for Standards
MIDP	Motor Industry Development Plan
PDCA	Plan-Do-Check-Act
PM	Process Management
QC	Quality Control
QMS	Quality Management System
TMC	Top Management Commitment
TQM	Total Quality Management

Chapter 1: Introduction

1.1 Introduction

The main aim of this study is to examine the extent to which the automotive company based in Durban has adopted TQM principles. The chapter outlines the motivation of the research, the problem statement and the objectives of the study.

Many researchers of TQM implementation such as Njie, Fon and Awomodu (2008), Hannson (2003), Abusa (2011), Maluleke (2008), Zhang (2000), and Oluwatoyin & Oluseun (2008) echoed six basic principles that should be involved in total quality management, these include Top Management Commitment (TMC), Employee Involvement (EI), Customer Focus (CF), Empowerment and Motivation (EM), Process Management (PM) and Continuous Improvement (CI). In relation to these principles, the study examines the degree to which these six TQM elements have been adopted. The study further seeks to find out whether or not the company views these principles as a means to improve their business and also if these principles are applied consistently in different parts of the organisation. This chapter outlines the background of the research

1.2 Motivation of the study

TQM is a worthwhile system to pursue since its principles are universal and have been proven to bring about increased performance in organisations. TQM has been widely investigated in developed countries and different researchers adopt and construct their research instruments according to elements relevant to their backgrounds. The six TQM principles in this study were adopted based on the combination of both local and international researchers particularly with the aim of developing a framework that may be standard for the context of South African manufacturing companies. There is also a growing shared sentiment by researchers and business leaders from various sectors about the lack of both management and technical skills in South Africa (Matlhape & Lessing, 2002). This study seeks to investigate this phenomenon and its influence or lack of it in the automotive company.

The target company based in Durban represents the pillar of automotive manufacturing in South Africa. It is a multinational company with long-established quality management systems regulated by ISO 9001:2000 (SEDA, 2012). Deductions drawn from the study will highlight the current status of TQM principles adoption in the company and these can serve as a reference for measure to other automotive companies.

1.3 Focus of the study

In this study a comprehensive list of six TQM practices will be examined for the extent of their implementation in two plants of an automotive company based in Durban. This study will add on the growing body of TQM literature around the world by using recognised TQM elements for analytical evaluation. The study's main focus will remain on evaluating the inputs that are known to be necessary for optimum quality and productivity in a manufacturing environment. The study will also focus on establishing means for assessing the level of TQM awareness within management in order to develop TQM framework for the context of South Africa.

The development of a framework relevant to South Africa will help create a base for future academic enquiry. The implications deduced from the study will be useful in improving business performance of the researched company and may also be used to encourage other organisations to adopt the principles of TQM.

1.4 Problem Statement

The South African automotive industry has become part of the global value chain and is faced with the challenges of increased competition for sourcing and outsourcing opportunities. In South Africa this has resulted in vehicles being priced too high for many to afford due to many variables such as inflation, productivity trends, market forces and the level of local content (Damoense, 2011). Naude & Badenhorst-Weiss (2011) continued to state that South Africa is 30-40% more expensive as a manufacturing base than China and India due to operational intricacies such as rising fuel prices and higher manpower costs hence Damoense (2011) and Lorentzen, Robbins & Barnes (2004) have expressed the need for the

local automotive industry to increase their competitive edge by improving productivity and quality levels to meet international best practice.

Many researchers and authors across the world such as Abusa (2011), Davis (2010), Hansson (2003), Oluseun (2008), Evans (2005) and Zhang (2000) agree that adopting international strategies such as TQM is imperative in strengthening an organisation's competitive position in fulfilling the needs of its domestic and international customers. This research aims to evaluate the status of TQM implementation in a South African automotive manufacturing company based in Durban with the aim of recommending strategies for improving management practices to meet modern global standards.

1.5 Research Objectives

In South Africa the automotive industry is the biggest contributor to GDP in the manufacturing sector and hence the study of quality management techniques in the industry highlights the status of its development. This study is designed to increase the level of awareness of modern techniques practiced internationally and to recommend remedies to increase the competitive advantage of the company based in Durban. This will be achieved by assessing:

- The extent to which the TQM principles have been implemented in the automotive manufacturing company based in Durban:
- The company's view of TQM principles as a means of improving their business performance; and
- Whether or not the TQM principles are being applied consistently between shifts, departments and plants.

1.6 Research Questions

The research questions are declared as follows:

Q1 - To what extent has the automotive manufacturing company in Durban adopted TQM principles?

Q1.1 - To what extent does the company's top management commit themselves to supporting programs that promote quality?

Q1.2 - To what extent does the company focus on involving employees into driving quality-related initiatives?

Q1.3 - To what extent does the company focus on customer relationship?

Q1.4 - To what extent does the company focus on empowerment and motivation of its employees?

Q1.5 - To what extent does the company focus on process management?

Q1.6 -To what extent does the company encourage and promote continuous improvement?

Q 2 - Does the company view these six principles, hence TQM as a means to improve their business?

Q 3 - Are the six principles of TQM being applied consistently between shifts, departments and the two plants?

1.7 Limitations of the study

There are universally accepted TQM principles which researchers adopt and slightly modify to suite their own background. Hence there is no standardised set research framework that applies to all. In comparing TQM implementation in researched companies across the world, a researcher would have to use more than one author and assess principles on an individual basis. This study hopes to develop a framework for assessing TQM in the context of South African manufacturing companies.

The automotive company based in Durban was the only participating company in the survey hence the study implications and status of TQM implementation cannot be generalised across the entire automotive sector or the general manufacturing sector. This study needs to be extended to various companies in various parts of the country to enable the results to be generalised.

Many TQM studies involve testing the effects of TQM on overall performance between companies with the system and those without. This study remained focused

on assessing the inputs that result in the overall performance which are the principles related to TQM. Research testing companies with TQM implementation and its impact on overall performance versus those without will give a clear indication of the effects of having the system in place.

1.8 Summary

Chapter one highlighted the background of the current study, defined the problem which the study tries to solve and clearly stated the objectives pursued in the study. Research questions were clearly outlined together with the motivation, contribution and finally the limitations of the study. Chapter two will provide the literature review of the study. This will include the theoretical framework of TQM principles adopted, performance benefits as a result of TQM implementation and finally the overview of the automotive sector. From the literature review and theoretical framework, research questions will be formulated together with a relevant hypothesis. Chapter three will cover the study population and the methodology applied in the research. The research sample will be discussed in detail together with the method of data collection. The development of the research instrument will be covered and the questionnaire structure will be outlined together with data analysis methods. Chapter four will discuss the analysis and the results of the survey conducted through the questionnaire. This will include the assessment of TQM implementation through the use of various statistical methods. Chapter five will present the conclusion and implications of this research. A general summary of the survey will be outlined together with the tests conducted in the previous chapter.

Chapter 2: Literature Review

2.1 Introduction

This chapter will outline the concept of quality from the authors who developed the philosophy during the 20th century. Quality assurance systems such as ISO 9000 and its role in assisting manufacturers in the assessment of their quality systems will be discussed. The fundamental relationship between ISO 9000 and TQM development will be explored together with the benefits of having these systems installed. The main principles that embody the concept of TQM in the South African context will be established and individually discussed in detail. An overview of the South African automotive industry and its operating environment will be highlighted. Various researchers in this field have voiced opinions about the industry's state of affairs which will be highlighted in the final sections of the study. Finally the literature review will be used to develop research questions and the hypothesis.

2.2 The Concept of Quality

There are many different definitions and dimensions of quality to be found in books and academic literature. In business, standards and specifications are common methods used to define quality. Few individuals can define quality when asked even though it is an issue that is dealt with on a daily basis. Individuals use different criteria when judging quality of a product and the degree to which the product meets these criteria determines the purchase of that product, hence people make distinctions based on the perceived quality of products in the market place. (Goetsch and Davis, 2010:4).

During the 20th century a number of well-known authors contributed to the development and advancement of quality philosophy. These include the following: Deming (1988), Crosby (1979), Ishikawa (1985), Juran (1966) and Taguchi (2005). Their definitions of quality were split between the creation of a product (or provision of a service) according to predefined specifications and the satisfaction of a customer (Abusa, 2011:11)

Phil Crosby's definition of quality was centered on a holistic approach to a product's (or service's) conformance to all measurable-characteristics of a defined specification. His main definition of quality is summarised here (Crosby 1979, cited in Abusa, 2011:12).

- It is essential to define quality as conformance to requirements if we were to manage it.
- It is important that the customer receives exactly what we have promised to produce (Crosby 1979, cited in Abusa, 2011:12). Meaning that the requirements should be known and as far as possible translated into a measurable product or set of service characteristics.
- With requirements stated in terms of numerical specifications, we can measure the characteristics of a product or service to see if it is of high quality (zero defects). Zero defects is a concept that promotes attitude of defect prevention. It implies that one should do the job right the first time (Crosby 1979, cited in Abusa, 2011:12).

Deming's quality philosophy was based on creating a link between the production of a product and consumer needs, with special focus on resources of all departments being channeled in a cooperative effort to meet those needs (Goetsch and Davis, 2010:15). Deming's quality perspectives are summarised as follows (Deming 1988, cited in Goetsch and Davis, 2010:15)

- Stop depending on inspection to achieve quality. Build in quality from the start.
- Break down barriers between departments so that people can work as a team.
- Because the quality is essentially equated to customer satisfaction, the quality of a product will depend to a major extent on the degree to which customer's needs and expectations are satisfied.

One of the most respected definitions of quality is given by the eight quality dimensions developed by David Gravin (1984) of Harvard Business School. The dimensions are not mutually exclusive, although they relate primarily to the quality of a product.

- Performance refers to the efficiency (e.g. return on investment) with which the product achieves its intended purpose.
- Features are attributes that supplement the product's basic performance, e.g. tinted glass windows in a car.
- Reliability refers to the capability of a product to perform consistently over its life cycle.
- Conformance refers to meeting the specifications of the product, usually defined by numeric values.
- Durability is the degree to which the product withstands stress without failure.
- Serviceability is used to denote the ease of repair.
- Aesthetics are sensory characteristics such as a look, sound, taste and smell.
- Perceived Quality is based upon customer opinion.

Considering the above definitions of quality it can be seen that quality is multidimensional since there is no one agreed-upon definition.

2.3 Quality Assurance Systems and TQM

The role and significance of ISO 9000 has been questioned by several researchers since its early establishment. Many authors raised a series of doubts and others disagreed over its significance in enhancing product and service quality, or its role in overall performance improvement of organisations (Abusa, 2011:18)

It is presumed that if a manufacturer has a good quality system in place then the manufacturer can be trusted for the supply of good quality products. According to Bandyopadhyay and Sprague (2003) ISO 9000 standards are designed for audit of the quality system and constitute the requirements for examining the presence of an effective quality assurance system.

According to Ismail and Hashmi (1999) ISO 9000 merely provided a guideline for a quality system that could maintain consistency in meeting standards and specifications. They argue that it was a document that provided minimal description of how these objectives were to be met, hence they referred to it as a blue print aimed at assuring customers about their supplier's potential rather than meeting their needs.

Other authors such as Abusa (2011:19) argue that the newer version (ISO 9000:2000. Launched in the year 2000) was developed for the purpose of assisting organisations to identify mistakes, to improve operational efficiency and to guarantee consistent levels of quality. He further compares the older versions' (ISO 9000:1994) standard requirements with the fundamentals of TQM and reveals several deficiencies. Some of these deficiencies include a lack in important aspects of quality such as: the inclusion and commitment of top management, the drive for satisfying customers and continuous training of employees.

In their study to establish the existence of a performance-relationship between firms with ISO together with TQM installed and those without, Ismail and Hashmi (1999) concluded that organisations with ISO 9000 and TQM firmly engaged had a higher performance index than those without these.

The argument is, if performance objectives and standards are set to promote continual improvement, emphasising defect prevention and the reduction of variation then it goes without saying that companies with ISO and TQM as their basis for a management system stand a better chance of meeting their objectives than companies without these. Elaborating on the achieved benefits of companies with ISO and TQM installed, Abusa (2011:18) concluded that not only large corporations stood a better chance of sustained business but fewer customer complaints and increased sales are a result of the effective implementation of these systems.

2.4 Principles of TQM

The use of problem-solving tools such as measurements and statistics were initially employed in manufacturing processes to reduce defects and errors in the system. Focus remained on process control and technical issues such as defect detection and machine reliability to maintain quality systems (Evans, 2005:12).

Organisations started searching for reliable ways of sustaining good quality levels and slowly gravitated towards the assessment of management practices employed on a daily basis. It was soon realised that management skills such as strategy formation, long-term relationship development, the ability to analyse data effectively and leadership skills were amongst the main drivers of sustainable quality and customer satisfaction (Evans, 2005:9)

Many researchers around the world have regarded TQM as a management framework that provides competitive strategies that help businesses improve their performance and position on the global stage. TQM has been recognised as the leading management system that many organisations identify as an important factor into their survival and growth. These organisations aim to exploit the benefits of TQM to rapidly expand their businesses and to deliver superior quality products and services to ensure the retention of their most valued customers. Davidson et al. (2006) state that through TQM businesses are enhanced by achieving the cooperation of everyone in the organisation and associated businesses ultimately to yield improvements in the areas of cost, quality and efficiency. In order to meet the needs of the customer, Davidson et al. (2006) state that the concept of quality needs to be ingrained in all facets of the organisation's philosophy and hence be reflected in all departments, processes and ultimately in the product or service the company provides. Vanichinchai and Igel (2011) further explain that quality must be represented from a preconceived business idea, to design stages and finally customer post-satisfaction. In order for this to be achieved it is important to bring external business associates in the supply chain on board.

Bandyopadhyay and Sprague (2003) state that top management have a vital role to play in implementing TQM in the workplace. Top management's commitment must not only be outlined in the mission statement but it must be seen and felt by the workers at the lowest level of the organisation's structure. This is done by not taking charge of quality initiatives but by allocating resources for the accomplishment of these initiatives (Bandyopadhyay and Sprague, 2003). Hence top management, as explained by Thomson (2005) is responsible for the collapse or success of a quality management system because their main responsibility is to create a quality culture by spending time transforming the organisation workforce into a quality conscious team. Maluleke (2008) states that it is unrealistic that organisations expect employees to be enthusiastic about a new way of doing work without expecting a form of compensation in return. In order for any quality management system to be maintained effectively, motivation of employees in the form of rewards for their accomplishments is imperative (Maluleke, 2008).

Hannson (2003:10) suggests a systems approach to the concept of TQM, declaring that TQM does not only consist of values such as customer focus, process focus or everyone's commitment. Hannson (2003:10) states that there are equally valuable techniques that support these values, such as customer-focused planning, process management and tools such as control charts, the quality house or Ishikawa diagrams.

According to Hansson (2003:11) the success of TQM lies in the organisation's ability to achieve excellence and increased customer satisfaction by redirecting focus to management practices whilst using the least amount of resources. Hence TQM is relevant to both product and service-oriented businesses.

In examining the above authors, there are fundamental concepts that emerge as a central role in the requirement for developing, implementing and maintaining a total quality management system, namely:

- Top management commitment;
- Employee involvement;
- Customer focus;
- Empowerment and motivation;
- Process management; and
- Continuous improvement.

2.4.1 Top Management Commitment

2.4.1.1 Mission and Vision

The organisational setting in which the team exists plays an important role in determining its performance. The extent to which organisations create cultures and encourage some risk-taking and open sharing of ideas, provide sufficient resources for teams, and provide employees with enough latitude to pursue and develop potentially valuable ideas or solutions is of vital importance. Abusa (2011:81) states that the main reason for the failure of quality systems is the lack of commitment especially from management to follow up on the initiatives. In most instances quality improvements are treated as a short-term programme rather than a never-ending process. He further argues that what lies at the heart of quality improvement is that

the purpose of management must remain resolute. “The executive leader of the organisation has to have a very clear idea and then communicate it very clearly to all in the organisation. Many executives define fairly clearly the business objectives of the organisation but give only moderate attention to the principles and the values or methods by which they want the business vision achieved” (Abusa, 2011:81). According to Macdonald and Piggot (1999:146) management need to lead the process by:

- Defining the constant purpose of the organisation and the improvement principles and values;
- Ensuring that there is a continuous programme of education and self-improvement for everyone;
- Removing all the barriers that prevent quality being achieved through people
- Providing the necessary resources; and
- Ensuring that their actions demonstrate integrity of continuous improvement process.

Kantabutra (2010:258) refers to performance vision as a cognitive image of a desired future state. It has been said that an organisation with a well-articulated vision can achieve sustained competitive advantage over those organisations lacking such a vision. Team members need to believe that the task has meaning and that it makes a real difference to some group or groups of people, customers, clients, other departments or society as a whole. An inspiring vision can overcome member’s natural resistance to taking on new work (Cohen & Bradford, 2005:194).

This notion is further discussed by Abusa (2011:81) when the researcher stated that leaders in the organisation are required to create a quality vision, reduce or minimise resistance to change, initiate quality as a culture, encourage continuous improvement and always to strive to meet customer expectations. He further explains that it is the leaders in the organisation who are responsible for challenging the status quo of employees’ quality mindset by providing ideas that stimulate and challenge the culture. According to Abdullah, Uli and Tari (2008:438) ‘soft factors’ such as management support and commitment assume top priority in the drive for implementation of a system such as TQM. Hard factors such as process control techniques were deemed as secondary since the core ingredient for a successful

implementation relies on ‘ownership’ of the system by employees (Uli and Tari, 2008:438).

Many researchers have emphasised and supported quality leadership by top management for proper implementation of TQM. This has been echoed by Njie et al. (2008:11) while they further state that the main reason for TQM’s failure in organisations is reluctance by top management to delegate authority to empower lower-level employees. They pointed out that TQM should be perceived as a culture with principles which needs to be adopted by all departments.

2.4.1.2 Leadership

Zhang (2000:27) describes leadership in an organisation as the ability of top management to establish and lead long term goals to sustain the business at a competitive level in line with constantly changing customer needs. These efforts are exemplified by coaching, empowerment, and implementing organisational change. Maluleke (2008) elaborates on this by stating that leaders play an influential role based on interpersonal relationships that can be witnessed by employee’s willing contribution to organisational goals.

The main generic decision leaders need to tackle is how to cause the change (Zadry & Yusof, 2006:1002). Maxwell (2010:141) argues that if leaders do not possess influence then it becomes difficult for them to lead others. He argues that people don’t care how much you know until they know you care. Leadership begins with the heart, not the head. It flourishes with a meaningful relationship, not more regulations (Maxwell, 2010:141). Zhang (2000:27) continues by stating that to be an effective leader, learning and development is imperative for the top manager. Continuous learning, including the knowledge of business principles is an essential requirement for leadership. Zhang (2000:27) further suggested that if management wanted to create an organisational culture that will be more amenable to learning, then it is their responsibility to attract others to the learning process by becoming learners themselves.

Maxwell (2010:150) also stresses the need for people development by stating that focus on employees’ needs and aspirations cannot be discounted if the leader is to build solid and lasting relationships that will affirm effective leadership.

Bacon (2012:25-26) states that the most important leadership characteristic is shown by the possession of influence rather than authority over subordinates. Influence effectiveness depends, in part, on the conventions, values, and beliefs prevalent in every culture. Influence is viewed as a process requiring constant revision to prompt the necessary impact.

Evans (2005:380) states that leaders establish plans and goals for the organisation and also help to shape the culture of the organisation through key decisions and symbolic actions. Zhang (2000:27) further agrees to this notion by stating that to avoid placing quality behind meeting production schedules, leaders need to pursue long-term business success by promoting quality and encouraging employees to analyse and improve work processes themselves.

2.4.2 Employee Involvement

2.4.2.1 Quality and Productivity

Cohen & Bradford (2005:188) state that managing task forces and cross-functional teams poses limited authority and this frustrates many leaders. Yet the need for more diverse specialties along with spreading organisational locations driven by global competition requires more complicated organisations. Even in situations where a leader is in charge of his or her own team of direct reports, it still isn't automatic that full cooperation will be obtained. When members of the team do not report directly to the leader, the challenge is much greater. Matlhape & Lessing (2002:30) further elaborate on this by stating that achieving the ideals of TQM requires the participation of employees in the process of reengineering, doing things differently and being able to communicate ideas with their seniors. For employees to display this level of involvement and commitment management must consciously transfer skills and power of authority and not take decisions for them.

Organisations operating on TQM recognise that the potential contributions of employees play a much greater role in improving quality and that the competitive environment of modern business requires flexible, fast reaction to changes in customer demands. Hence the need for employee participation is vital and remains a key element in managing changing organisations. This has been echoed by many leading and influential voices both in business and in academia for several reasons.

One of these reasons is complexity in the workplace. Given a large volume of data available to managers, unilateral decision-making becomes a thing of the past. Business is also transforming itself from a 'command and control' environment to one of collaboration (Foster, 2010:462).

Many authors recommend that employees be involved in the initial stages of TQM implementation since collaborative efforts from everyone in the organisation are fundamental to a successful launch of the system. Such collaboration is needed as complexity drives workers from routine work to knowledge work or work that involves the development and transmission of knowledge and information. Knowledge work is effective when workers are given a certain amount of autonomy and decision making authority (Foster, 2010:462). Maluleke (2008:11) states that employees who are given authority to make work related decisions are automatically encouraged to take ownership of that particular task.

> "Organisations are faced with competitive demands for lower costs, higher performance and greater flexibility. As a result they are turning to employee involvement to enhance their participation, commitment and productivity of their members. It is believed that this increased employee involvement can lead to quicker, more responsive decisions, continuous performance improvement, and greater employee flexibility, commitment and satisfaction" (Maluleke 2008:11).

Sharma and Kodali (2008:612) also argue that what determines the success or failure of companies is not the techniques used in a process or adoption of the latest technologies, but the people directly involved in using these techniques and resources. Since TQM is a system that requires change in the relationships between managers and subordinates, Sharma and Kodali (2008:612) maintain that shift from people management to change management must also take place.

> "The way the employees are hired, trained, treated, nurtured, recognised, rewarded and involved is the key for achieving total quality. Without peoples' commitment, quality control will continue to be problem detection and correction, not problem prevention and improvement" (Sharma and Kodali, 2008:612).

Maxwell (2010:152) puts it more directly:

> "A worker's main responsibility is doing the work himself. A leader's responsibility is developing others to do the work. The true leader can be recognised because somehow his people consistently demonstrate superior performances".

A growing body of research on employee involvement appears in the literature highlighting intervention as being the main factor for enhanced productivity in the workplace through reduction of cost. A reduction in waste effectively improves production efficiency, which means that the cost of making the product becomes less while profits increase (Rose, 2005:11). According to Maluleke (2008:12) the participation of employees in the change process enhances the chances of ownership and its likelihood of becoming organisational culture. Abdullah, Uli and Tari (2008:440) state that factors such as employee satisfaction, empowerment and management commitment were a few of the attributes which encouraged employee involvement and consequently enhanced quality improvements.

2.4.2.2 Ownership

Ownership of a process by a team is an important indication of a team's transition from being managed to a self-managing unit. Ownership enhances the team's effectiveness since members become part-owners of the process with actions and outcomes that result from their authority and responsibility. The results of ownership are witnessed in the pride that teams place on their work and outputs. It is also witnessed by the team's effective strategies and follow-up efforts on outstanding issues. Ownership enhances the need and desire to engage in learning and development in order to take over the responsibilities of a self-management team effectively (Neider and Schriesheim, 2005:204).

2.4.3 Customer Focus

Hansson (2003:13) looks at quality as a relative concept, which is set by market competition. He explains that organisations must have a long-term commitment to satisfying customers since the quality of a product can greatly be weakened if a competitive product with better characteristics enters the market. Al-Saket (2003:18)

further reminds that managers should consider customers as the basic value that guides organisations activities since there would be no business without the customer. He states that the basic condition for business success relies solely on customer satisfaction.

Customers are important for many reasons. Customers buy products and define needs for new ones by complaining or showing lack of interest and by giving valuable information that leads to the improvement of the product (Rose, 2005:20). Evan and Dean (2000) argue that over the years the perception of a customer by businesses has evolved from being a buyer or service user to being an active partner and the judge of their quality management systems. They maintain that loyal customers spend more, refer new clients, and are less costly to do business with, while on the other hand poor quality costs businesses more in the form of warranties, negative publicity due to complaints from dissatisfied customers. This is true according to Al-Saket (2003:18) who suggest that organisations need to turn their structures up-side-down by putting the customer at the top of the pyramid, since customers' needs should form an essential input for the designing of the production process and should influence decision-making.

Customer driven quality represents a proactive approach to satisfying customer needs by providing products and services that satisfy them. Customers are also a source of knowledge concerning the performance of the production and service system (Forster, 2004:129).Klefsjo, Bergquist and Garvare (2008:120) concur by saying that quality excellence with a strong focus on customers and their satisfaction should be one prerequisite to achieve true business excellence.

Both internal and external customers are equally important. The customers inside the organisation are employees while those outside are clientele. In a typical manufacturing organisation a particular job is accomplished in a network of interdependencies, where an input received by an employee is in actual fact an output supplied by the preceding process. In this case, the employee is both a customer to the predecessor and a supplier to the following process. Therefore Al-Saket (2003:19) proposes that manufacturers need to study requirements of customers and to consider their opinions when they design and develop a product.

2.4.4 Empowerment and Motivation

Dean (2005:348) defines empowerment as a transfer of power or privileges. In TQM empowerment is granting trust and authority to subordinates to make choices without management approval in order to serve customer needs. Evan and Dean (2000) state that for empowerment to occur, managers must cascade decision-making to the lowest possible level. In doing so, managers increase employee confidence and worker participation in decision-making.

Evan and Dean (2000) argue that empowerment is when management give employees responsibilities together with authority to carry out tasks that are challenging whilst giving them freedom to form horizontal relationship with them. They argue that the new team formed between management and employees acts as a powerful motivational tool for the employees. Njie, Fon & Awomodu (2008:13) agrees with this notion by stating that a flattened structure allows for a multi-skilled workforce.

Successful organisations place great importance on motivating their employees by involving them in decision making and also by rewarding them for their efforts. (Oakland, 2003:273). A study conducted by Njie et al. (2008:13) described empowerment as “intrinsic task motivation that manifests itself in four cognitions reflecting an individual’s orientation to his or her work roles”. By intrinsic motivation, they are referring to “positively valued experiences that an individual derives directly from a task that produce motivation and satisfaction”. These cognitions were further described as impact, competence, meaningfulness and choice. Meaningfulness refers to the value of the task given or the match between the individual’s competence and standards with the activities to be performed. Impact refers to the degree to which behaviour is observed to be making a difference in the individual’s accomplishment of given tasks, while choice involves a causal responsibility in personal actions.

Oakland (2003:273) states that there are three common initiatives in successful organisations which place great emphasis on empowerment and motivation:

1. Employee suggestion schemes which provide a formalised motivational platform for promoting participative involvement for promoting work process improvement initiatives from employees;
2. Effective Appraisal systems for measuring key performance indicators and rewarding employees for their efforts in improving quality and efficiency in their organisations; and
3. Education and training.

Oakland (2003:273) states that successful organisations aim to increase motivation in their employees by empowering and encouraging them to formulate plans that will effectively shape the vision of the business.

> "The more people understand the business and its vision, the more they become involved and committed to developing the organisation's goals and objectives" (Oakland, 2003:273).

Njie et al. (2008:14) suggest that managers must strive to enhance the feeling of worthiness in employees by expressing confidence in them. This is a good strategy for motivating as well as expressing high performance expectations (Njie et al., 2008:14). They suggested that this could further be enhanced by management delegating responsibility for functions that were formerly within their domain. They pointed out that in a TQM environment management had the sole responsibility of identifying and removing conditions that would render employees powerless to take charge of improving their work environment. Maluleke (2008:12) states that training of employees is imperative and the senior management should allocate significant resources to this end. He further argues that senior managers need to challenge lower level managers not to lead quality initiatives but to merely provide an atmosphere of creativity for employees to showcase their talents and skills to improve the organisation's overall effectiveness.

2.4.4.1 Education and Training

Neider and Schriesheim (2005:10) argue that team training is an effective strategy for promoting team learning, in that trained teams become more coordinated, exhibit more team-work behaviour, communicate more often, develop more shared knowledge representations and make fewer errors.

Macdonald and Piggot (1999:176) state that a clear objective of the plan is to define activities that will support a systematic change in the organisation's culture that is based on continuous improvement that can be shared by everyone. They argue that the most powerful vehicle available to achieve this change is through education and training since the aim is to influence people's attitudes so that they take common ownership of the need to change and also to learn the skill of using communication and problem-solving tools. Njie et al. (2008:15) put more emphasis on this notion by stating that training does not only necessitate successful implementation of TQM but it also provides employees with the skills and knowledge necessary to carry out tasks themselves without assistance from management. It is important that employees take control of their work process by continuously tackling projects that will enable them to make changes and hence improve overall quality of the product.

Njie et al. (2008:15) also stressed the need for management to clearly communicate the necessary terminology required in the implementation of TQM, so that employees may also develop their own definitions to encourage a sense of ownership of the given tasks. They further advised that empowerment should be designed to enable shop-floor employees to be able to overcome workplace constraints. Taking part in decision-making and in the formulation of organisational imperatives are key factors through which these constraints can be overcome.

2.4.5 Process Management

Process management refers to systems and procedures implemented on the shop floor to control and improve activities related to production. These include employees' workflow rearrangement, the creation of quality standards and inspection procedures in order to optimise quality and efficiency. Process control can enhance a manufacturing process to operate at optimum levels with fewer breakdowns, material shortages and equipment inadequacy (Zhang, 2000:32).

Equipment failure is the most common cause of inefficiency in many manufacturing environments hence the maintenance of equipment capability is the most important component of process management. Equipment maintenance ensures variation in product tolerances are minimised hence product-control standards are maintained to keep manufacturing processes running. Under constant use, manufacturing

equipment eventually deteriorates resulting in poor quality products being produced. This necessitates a programme of preventative maintenance which ensures a regularly managed inspection of production equipment based on a schedule. This is done to examine and fix process facilities so that they do not halt the manufacturing process (Zhang, 2000:32).

Zhang, (2000:32) states that there is a need for process improvement, such as in trying to design an 'foolproof' process in order to minimise chances for employee error. He highlighted that separate inspection to improve quality was costly, ineffective and it occurred too late. By fool-proofing he referred to methods that ensured operations can only be performed correctly, such as pake-yoke. These involve alarms and controls such as buzzers and lamps that may be activated when a defect is detected. Control systems may come in the form of automatic machine stoppage devices such as detectors that may halt the machine if a mistake occurs so that a defect does not move to the next process.

2.4.6 Continuous Improvement

Continuous improvement refers to the philosophy of Deming's wheel – Plan-do-check-act (PDCA) to continuously improve an organisation's quality of their products, reduce costs and to achieve overall customer satisfaction. Oluwatoyin and Oluseun (2008:13) argued that customer satisfaction can only be attained through relentless improvement of manufacturing processes; hence continuous improvement is the pursuit of improvement in the delivery of value to customers. There are two types of corrective action that the PDCA allows in a process; temporary and permanent action. Temporary action is taken immediately to alleviate any ailments that may cause work stoppages or that may result in compromising quality output in a process. Permanent action involves investigating and eliminating the root cause of the problem (Basu, 2005:134).

According to Sharma and Kodali (2008:614) seeking process improvement opportunities is the best way of improving organisational performance. The status quo must constantly be challenged by encouraging employees to focus on practices that will improve internal performance of a system. This will inevitably lead to the improvement of external performance of the system. Quality Performance measures

can be derived in various ways. These can be in terms of business results, business objectives, and external or internal quality performance. They further state that complaint resolution forms an important component of a quality management system. To understand customer behaviour, wants and needs, data about the customer is necessary. This information can come directly from the customer in the form feedback. A TQM system must also ensure that corrective action is executed consistently within the framework of the system. A documented system is primarily a device to handle problems that cannot be solved immediately by first line supervisors. Oluwatoyin and Oluseun (2008:14) state that the principle behind the idea of continuous improvement is that mistakes can be avoided hence the continuous looking for ways to improve the quality of a product in the absence of a customer's complaint may prevent future problems. In dynamic environments organisations are liable to continuously improve their operations, since competition heightens change as a result of customers' needs, competitors' activities and product innovation.

2.5 The effect of TQM on Performance

2.5.1 Employee Satisfaction

Abusa (2011:32) discovered that successful implementation of TQM relied mostly on behavioural values and certain features such as top management commitment; effective communication; employee involvement; and less on TQM tools and techniques such as process management, benchmarking or control charts. Zhang (2000:43) continues by stating that employee satisfaction should be considered the main key performance measure in business effectiveness since behavioural changes directly affect the firm's functioning. Consequently negative attitudes by employees towards their work have detrimental effects on the firm. Organisations that take a keen interest in their employees' wellness and satisfaction levels are likely to witness more employee cooperation to assist management in achieving set targets. Nonxuba (2010:35) states that TQM creates a culture of a happy working environment because everyone in the organisation becomes motivated to control and manage their own processes.

2.5.2 Product Quality

Zhang (2000:43) states that a product's quality image can significantly improve a company's overall long-term success potential and its advantage at a global level. Nonxuba (2010:36) further says that in the context of TQM, employees that are closest to the work are given the power to identify and tackle problems they encounter hence TQM organisations possess an advantage of eliminating problems at their root cause as opposed to reacting to them. Many authors including Tanninen (2008:43) state that the primary goal for implementing TQM is to increase competitiveness through increased employee focus and awareness on satisfying internal and external customers.

2.5.3 Customer satisfaction

Zhang (2000:43) refers to customer satisfaction as the degree to which a company would engage and utilise its resources to produce a product or render a service that would meet customer expectations. Hence customer satisfaction serves as an indicator of the company's commitment to excellence. Nonxuba (2010:35) continues to state that if successfully implemented TQM benefits include improved customer satisfaction, teamwork, improved communication and efficiency. Therefore TQM implementation should serve as an opportunity for organisations to re-establish their cultures and business operations.

2.5.4 Financial & Operational Performance

Effective implementation of TQM leads to beneficial financial outcomes such as a reduction in scrap and rework associated costs. Other benefits include operational outcomes such as improved competitive advantage through reduced mechanical failures which result in downtime (Nonxuba, 2010:35). The elimination of waste results in lower costs and higher productivity, hence simplification of processes also results in work-flows that are simpler and of higher productivity (Foster, 2010:146).

2.6 An Overview of South Africa's Automotive Industry

2.6.1 Introduction

The automotive industry can be categorised into three broad market segments:

- Original Equipment Manufacturers (OEM) or vehicle assemblers,
- Automotive components,
- Independent aftermarket (retail, distribution & servicing) (Deloitte, 2012:5).

During the 1980's, South Africa's vehicle market experienced slow growth and was remote from major markets due to political instability and increasing international isolation. Future prospects were bleak mainly attributed to the fact that the industry was serving a small domestic market. The industry had substantially less foreign presence in comparison to other countries. In the 1990's this pessimistic perspective was shared by most industry participants including firms, trade unions and government agencies. The industry was uncompetitive and highly protected by tariffs and a series of local content programmes (Black, 2009:484). Domestic assemblers were bound by legislation to support domestic component manufacturers due to government's local content requirements. Most of the local component manufacturers were less competitive in price and quality as compared to their international counterparts but choice was limited since severe excise penalties were imposed on imported goods (Barnes and Morris 2008:40).

The Motor Industry Development Plan (MIDP), a policy programme introduced in 1995, had a strong influence in the recent development in the industry. A phase down in tariffs was scheduled and local content provisions were removed while import-export complementation were slowly introduced. South African assemblers rapidly fell in line with their developed parent company operations, hence rapidly reforming their presence and position within global value chains (Barnes and Morris, 2008:40).

Gradual recovery slowly resumed and since 2003, sales have grown reaching 617,000 units in 2005. In 2005 alone 525,000 vehicles were produced, of which 26.6% were exported (Black, 2009:489). In 2010 the automotive industry exported to a total value of R585 billion (11.9%) of the total exports from South Africa, mainly to

China, USA, Japan, Germany and the United Kingdom (Naude and Badenhorst-Weiss cited AIEC 2011:49).

Barnes and Morris (2008:42) state that since vehicle manufacturers produce according to globally standardised norms, poor quality and performance from local component manufacturers can no longer be tolerated. The industry has become globally competitive which means business is easily transferred to foreign counterparts if conformance to specified performance targets is not met. The industry is one of the important sectors in job creation and in promoting economic growth. The automotive industry is South Africa's largest manufacturing sector with an estimated contribution of 6% to 7% to GDP (Deloitte, 2012:5). South Africa exports components and vehicles to 130 countries which include Algeria, Canada, Hungary, Thailand, Denmark and Russia. Germany was South Africa's top export market in terms of value, with vehicle and component exports worth R14 billion followed by the US (R3.4 bn), the UK (R2.7) and Spain (R1.9bn). in 2012 South Africa had a market share of 0.66% of total global production and ranked 23rd among vehicle producing countries (Fin24, 2012) The Beginning of year 2013 saw the Automotive Development Plan (APDP) come into effect with the aim of ramping up vehicle production to some 1,2 million units by 2020 and also to offer enhanced support to the local industry. (Deloitte, 2012:7).

Despite these progressive strides South Africa's local content in vehicles produced remained low. Increasing local content remains one of the South African's core government objectives in order to increase employment opportunities and local economic development, hence the development and growth of local supplier base remains important (Naude and Badenhorst-Weiss, 2011:49).

2.6.2 The operating environment of the automotive industry

Today South African OEM's are majority owned by global companies and are the most powerful players in the industry, resulting in key decisions being made in Europe, the USA and Japan (Naude and Badenhorst-Weiss, 2011:50).

Changes in the industry are fast accelerated by the globalisation of production, with underlying strategies being driven by certain underlying global trends. Developing countries too are not exempted from this shift. They are also faced with challenges of

dealing with the direct impact of major global trends especially the increasing level of competition amongst each other for sourcing and outsourcing opportunities.

The commonality of products offered around the world is the characteristic of globalisation. Global production strategy aims at commercialising the same product in several countries at the same time. New quality requirements are often introduced when deciding on a production of a global product. This is usually in the form of gradually improving or substituting older process techniques with newer and more efficient ones (Ndamase & Steyn, 2011:119-3)

Ndamase and Steyn (2011:119-3) argue that a successful production system depends on a highly motivated workforce. In South Africa the low education level of the labour force and the legacy of shop floor conflict used to impose constraints on introducing such a system. Naude & Badenhorst-Weiss (2011: 61) further state that the problem in the internal operations of the automotive industry is the availability of skills. Both skilled and unskilled staff do not possess the capacity to execute tasks efficiently and effectively.

Matlhape & Lessing (2002:21) concur with to the assertion that the most important ingredient into a quality management system is the people involved. As more employees spend most of their time in the workplace, it becomes important that relationships in the workplace receive as much respect as relationships outside work. In South Africa and many parts of the world, one of the phenomena threatening the ideal of customer satisfaction, quality output and continuous improvement is the management of an increasingly diverse workforce. Workplace cultures are dominated by Western ways, thus the development of unique systems and processes based on both the combination of foreign and African cultures becomes a challenge.

Skills shortage is another major problem for South African business. The sources of low productivity are, amongst other things related to the lack of technical and management skills. Matlhape & Lessing (2002:29) further state that the philosophy of TQM far outweighs normal process control mechanisms such as quality assurance techniques. TQM is a strategy related to challenging the fundamental beliefs and cultures of an organisation by training and developing employees and thus harnessing their enthusiasm through participation (Matlhape & Lessing, 2002:29).

2.7 Research Questions and Hypothesis Development

2.7.1 Development of Research Questions

The literature review was used to develop the research questions based on the constructs of TQM. These elements include Customer Focus, Top Management Commitment, Employee involvement, Empowerment and motivation, Continuous Improvement and Process Management. A research framework showing the linkage between TQM elements and Operational Performance was highlighted to illustrate the connection between the two. The main research questions for this study are listed below:

1. To what extent has the automotive manufacturing company in Durban adopted TQM principles?

2. Does the company view these six TQM principles as a means to improve their business?

3. Are the six principles of TQM being applied consistently between shifts, departments and the two plants?

2.7.2 Hypothesis Development

Null hypotheses were further developed following the determination of the extent of implementing TQM elements and their impact on organisational performance. The hypotheses developed in this study are listed below:

H1. Top Management commitment is positively related to employee involvement.

H2. Empowerment & motivation is positively related to employee involvement.

H3. Employee involvement is positively related to process management.

2.8 Summary

This chapter began by exploring the basic concept of quality. Dimensions widely cited by various authors around the world surrounding product quality and service quality were explained. The evolution of quality management and the role of International Standards Organisation (ISO) were also explored.

The concept of TQM and its core principles was introduced and identified as one of the competitive management strategies for improving business performance and for delivering high quality products. These principles were revealed to be reliant mostly on behavioural values and less on tools and techniques for process management. Outputs that were associated with TQM implementation included product or service quality, customer satisfaction, employee satisfaction, financial and operational performance. An overview of South African automotive industry was reviewed together with the sentiments echoed by researches in this field. Changes in the industry were seen to be accelerated by globalisation of production while the industry also faced increasing levels of global competition with regards to their exports. Constrains such as the educational level of shop floor employees, management and technical skills shortages amongst managers were seen as factors that contributed to low productivity in the sector. Following the literature review, a set of research questions and hypotheses were developed to be tested and analysed in the chapters that follow.

Chapter 3: Research Design and Methodology

3.1 Introduction

The research questions developed in the previous chapter will be answered by applying a research methodology that will be discussed and put into context in this chapter. This includes the highlight of the objectives of the study and its investigated variables. The reason for choosing the location of the study together with the respective participants is discussed. The development of the research instrument and the data collection methods are detailed. In addition, this chapter will discuss the key motivation for formulating the structure of the research instrument and will explore the statistical methods used in investigating the status of TQM variables.

3.2 Aims and Objectives of the study

The aim of this research is to establish the extent to which the automotive manufacturing company has adopted TQM principles. This includes the review of the status of implementation of the following principles: Top Management Commitment (TMC), Employee Involvement (EI), Customer Focus (CF), Empowerment and Motivation (EM), Process Management (PM) and Continuous Improvement (CI). The study will seek to establish if the company view these principles as a means of improving their business and also establish if the application of these principles are consistent within the plants, shifts and departments.

3.3 Participants and location of the study

The criteria for approaching the particular study to be conducted in this multinational organisation were to establish the extent to which the organisation has adopted TQM practices together with the approaches and tools that are used to manage quality and hence productivity from an organisational and operational perspective. The company operates in the global vehicle manufacturing industry and it comprises various multinational divisions producing motor vehicles in which it is a current global leader (fin 24, 2012). The company is known in the local automotive industry as a consistent leader in terms of vehicle sales. The company's main focus is on vehicle

production, where quality of the product is placed at a high premium and forms part of the company's strategic focus on retaining market leadership. The vehicle manufacturing facility based consists of two major assembly plants and four supporting plants.

The study covers one supporting plant and one major assembly plant. The target population in these plants were the management of various departments. Leadership of various departments from these plants were contacted to join the study, since the management of quality requires inclusive participation from everyone in the manufacturing process. Leadership included Senior Managers, Line Managers, Group Leaders and Team leaders. Senior Managers oversee and are responsible for overall departmental performance. A manufacturing plant typically consists of the following departments: maintenance, quality, production and logistics. Line managers from these different departments report directly to their respective Senior Managers. Below the organizational structure of Line Managers are Group Leaders who oversee shop-floor performance in their respective departments. Line managers typically have two or more Group Leaders reporting to them. Group leaders have three or more Team leaders reporting to them. Each Team Leader directly manages a number of members on the shop-floor who do the actual work. The reason for selecting this company was that:

(1) It is global and multinational in nature which provides a good platform for a study such as TQM as it is also applied globally;

(2) It is a long-established company comprising different plants or business areas, whereby the first plant acts as a supplier to the second, and where management principles are expected to be carried out uniformly throughout the plants.

(3) The company was already familiar with quality management system practices and has implemented them for over twenty years.

(4) The researcher is a quality manager in one of the plants and has been with the company for eight years.

3.4 Method of Data Collection

The method of collecting information or data can be done in two ways, namely primary and secondary data collections. Secondary data can be obtained through sources that already exist, such as textbooks, academic literature such as journal articles and online resources. Secondary data can assist the researcher with the understanding and formulation of the research problem while allowing scientific analysis deductions to be made (Oluwatoyin & Oluseun, 2008:33). In this study secondary data such as journals, internet articles, textbooks and company records were used.

Primary data can be used in conjunction with secondary data or as a substitute if secondary data is unable to contribute to the research objectives. Sekaran and Bougie (2010:180) state that the most popular research instrument used to collect primary data is a questionnaire, which is used by a researcher to collect variables of interest required for the research. The research instrument used in this study was a self-administered questionnaire. A total number of 101 questionnaire responses were obtained. The distribution method was chosen for the purpose of clarifying any uncertainties that the respondent might have and for the researcher to encourage quicker responses per individual.

Respondents were informed of the reason for their participation and the objectives of the research. This was done to highlight the core intention of the research which emphasised honest evaluation of current TQM practice from their own perspectives.

3.5 Research Design and Methodology

3.5.1 Description and purpose

Oluwatoyin and Oluseun (2008:31) state that methodology is about reliability of information represented in an investigation. It is a method that uses procedures and techniques that are essential in gathering information to be used in research. Brehm (2001:49) further argues that the method used for research varies according to the paradigm and assumptions made in the study.

Different research approaches can be generally categorised into three possibilities, namely qualitative and quantitative research methods or the combination of the two. Qualitative research relies on interpretation of practices through taking notes of conversations, conducting interviews, and recording memos. The researcher studied the natural settings, then attempted to make sense of phenomena by interpreting the settings observed together with the information obtained through interaction with people. (Hannson, 2003:40). Brehm (2001:50) gives a less philosophical explanation by stating that the methodology employed in qualitative research aims to extract depth and to provide a detailed encounter of personal interactions in settings of the researched phenomena. The qualitative researcher avoids direct quotations and descriptions of activities and behaviours of people during his or her interactions (Brehm, 2001:50).

Quantitative research methods are generally used to extract and analyse numeric information in the form of statistics. This notion was explained by Oluwatoyin and Oluseun (2008:31) by stating that this technique uses statistical techniques to analyse data measured by means of numbers from an identified problem. The results from the analysis are used to determine whether or not the findings of the research can be generalised.

A comprehensive review of management literature was used to conduct this research. The researcher adopted a deductive approach to draw conclusions and the research attempted to establish the extent to which TQM has been adopted in the automotive manufacturing company based in Durban. Nyawera (2009) states that a deductive approach is when a research methodology is designed to test the hypotheses developed earlier with the literature.

3.5.2 Hypothesis Development

A literature review related to various concepts that make up and define TQM was conducted. This review provided a useful knowledge base of critical concepts that make TQM an effective system. This included various definitions of TQM, the purpose that the system is meant to achieve, critical components that are key in driving the system and the results expected from a successful implementation of the system. The hypotheses development encompasses the relationship between four of

the TQM principles namely top management commitment, employee involvement, process management and empowerment & motivation.

Utilising the information from both the literature review and the researcher's personal experience, it was possible to devise the hypotheses for this study. The hypotheses were developed from the four principles of TQM as follows:

H1. Top Management commitment is positively related to employee involvement

H2. Empowerment and motivation are positively related to Employee involvement.

H3. Employee involvement is positively related to process management

3.5.3 The Research Instrument Development

A combination of both secondary and primary data was used to design the research instrument. Maharaj (2009:43) states that the advantage of a questionnaire-based research approach is that it involves standardised questions, which provide a platform for uniform interpretation of questions by respondents. A questionnaire also provides an efficient way for data collection and can be distributed to a larger sample size unlike other methods such as interviews.

According to Maharaj (2009:43) questionnaires can be used for descriptive or exploratory research. Maharaj (2009:43) describes an exploratory research as a study that enables an examination and explanation of relationships between variables, particularly cause-and-effect relationships. Sekaran and Bougie (2010: 103) further add to this notion by saying that when not much is known about the situation at hand or there is no readily available information on how similar issues were dealt with in the past, exploratory studies may be undertaken. Descriptive studies are undertaken to understand characteristics of organisations that follow certain common practices (Sekaran and Bougie, 2010: 105). The study may be conducted in order to ascertain the principles of certain variables of interest such as TQM.

3.5.4 Questionnaire Structure

The questionnaire used in the research had two sections to be answered. Part one involved the particulars of the respondents and part two was based on the respondent's knowledge of TQM. Section two began by assessing the respondent's theoretical knowledge of TQM and their view of its implementation in the company. Then the six constructs of TQM were tested by presenting five options to participants to choose the answer that expressed their feelings most accurately about the statement. The research instrument used a 5 point Likert scale with closed-ended questions, the neutral option being in-between the agreeing and disagreeing options. This was done to accommodate participants that preferred not to comment on a particular statement or participants that were simply not sure of the answer. The questionnaire included two sections:

Section 1: This section addressed the demographic information of the company based in Durban and the respondents. This related to the type of Plant, the department, the respondent's management level, educational level, age and their work experience.

Section 2: This section began by an open ended question to judge respondent's theoretical knowledge of TQM and then interrogated the extent of TQM practices within the company by asking closed ended questions with regards to the following TQM principles:

- Top management commitment
- Employee involvement
- Customer focus
- Empowerment and motivation
- Process management
- Continuous improvement

Each of these TQM principles had its own set questions to be answered which were adopted from various TQM researchers such as Njie, Fon and Awomodu (2008), Hannson (2003), Abusa (2011), Maluleke (2008), Zhang (2000), and Oluwatoyin & Oluseun (2008). The questionnaire was accompanied by an informed consent form

to ensure that the participants were aware that their participation was voluntary and that they had the right to withdraw completely from the process at any time.

3.5.5 Pretesting and Validation

It is important to make sure that the operational variables that are set out to be measured in a study involves an instrument that can indeed measure them accurately. Thus reliability testing shows how consistently a measuring instrument measures the variables that are to be assessed by the researcher. Consistency in the result obtained thus proves the reliability of the instrument used in the research (Sekaran and Bougie, 2010:157). The present study can be regarded as reliable if collected information lead to the same results when the study is repeated. The internal consistency of a questionnaire is measured by Cronbach's alpha which is also important for the deletion of the individual components (Abusa, 2011:121). Abusa (2011:122) states that reliability coefficients of 0.70 or higher are considered adequate while alpha values of slightly lower than 0.60 for newer scales would also be acceptable.

Thus the questionnaire was tested for reliability using Crobach's Alpha and the six TQM (Top Management commitment, Customer Focus, Employee Involvement, Continuous improvement, Process Management, Empowerment and motivation) elements developed were judged for reliability. Accordingly, the six TQM elements were judged to be reliable and this is represented in Table 3.1.

Table 3.1: The Reliability Coefficient (Alpha) of each TQM Element

Construct	Number of items	Cronbach's alpha
Top Management Commitment	6	0.891
Employee involvement	6	0.780
Empowerment and Motivation	6	0.833
Customer Focus	6	0.907
Process Management	6	0.902
Continuous improvement	4	0.835

As can be observed from Table 3.1 all the six TQM constructs have Cronbach coefficients above the 0.70 threshold.

Validity testing on the other hand determines whether or not the measured concept was the appropriate one. It determines how well an instrument that is developed measures the intended concept. Maharaj (2009:43) describes validity of a sample as dependent upon accuracy and precision; where accuracy refers to the degree to which bias is absent and precision is the degree to which the sample is representative of the population. The validity of the contents of the questionnaire was conducted through interrogation of the context literature review and the researcher's own personal experience in the industry.

3.6 Data Analysis methods

Raw data was collected, encoded, captured and then statistically processed using SPSS 15.0 for data analysis. Descriptive and inferential statistics were used to obtain the means and frequencies from the research data. According to Maharaj (2009:48) descriptive statistics seek accurate observations such as the validity and reliability of the observations as well as the representation of the sample in the data. Inferential statistics involves taking small samples of the population and then making inferences using estimation and prediction. Claims will be validated through various measures and significance testing.

A Chi-square test was used to establish whether or not there was a relationship between TQM awareness and demographics such as work experience, level of education, plant, department, shift or position. Abusa (2011:158) states that if the difference-between-the-means of two groups are to be compared on the same variable then a t-test serves as a useful statistical tool. In this study, a t-test was conducted to establish whether there were any significant differences in the application of TQM between two plants where the research was undertaken, namely Weld and Press plants.

It is necessary to determine how one variable relates to another variable with respect to nature, direction and significance of each bivariate relationship. A statistical tool used to provide the strength of association between two variables is the Pearson's correlation coefficient *(r)*. A zero value indicate the absence of a relationship

between variables while a positive sign indicate a positive relationship and a negative sign is indicative of an inverse relationship. It is also important to note that a linear relationship may be established between variables hence a low Pearson's correlation coefficient may not necessarily mean an absence of a relationship (Maharaj, 2009:48). In this study key variables (6 TQM elements) that relate to the research problem were tested for inter-correlational relationships, then deductions, inferences and estimates were made to enable the ultimate answering of the research hypothesis.

Regression analysis was further used to assess whether or not there are any significant differences between plants, departments and shifts in the extent of TQM implementation. Onyekumnaru (2009:47) states that analysis of variance (ANOVA) is the common tool used to test significant differences between means (for groups or variances). The key statistic in ANOVA is the F-test of difference of group means, testing if the means of the groups formed by values of independent variables are different enough not to have occurred by chance. If the group of means do not differ significantly then it is inferred that the independent variable(s) did not have an effect on the dependent variable. It is not a test of differences in variances, but rather assumes relative homogeneity of variances (Onyekumnaru, 2009:47).

3.7 Summary

This chapter outlined the steps followed in reaching the design of the methodology that was suited for this particular study. A comprehensive review of the research objectives and hypothesis formulation was highlighted and the research process to be followed was outlined.

Qualitative and quantitative research methods were discussed and a deductive approach was used to draw conclusions to the research that studied established relationships in the company. A questionnaire was used as a research instrument to collect primary data and reliability testing of the six elements of TQM was performed and tabulated. Statistical techniques to be used in the following chapter were discussed and presented. The results from the data analysis will be presented in chapter 4.

Chapter 4: Survey Results

4.1 Introduction

This chapter presents the results from the data obtained by the questionnaire distributed to respondents. Various statistical analysis tools used to answer the research questions will be discussed. The questionnaire was administered to 150 people and 101 of them were returned representing a response rate of a little over 67%. The information collected by the questionnaire included demographic information about the participating respondents and the extent to which the respondents knew about TQM and its implementation in the company. The detailed analysis of the results derived from the questionnaire will be presented in this chapter.

4.2 Analysis of Research Population

Male respondents (93%) above the age of 40 years old dominated the gender dimension in this research. More than half of them had experience of more than 10 years in the company. Most of these respondents (57%) were from the production department. These statistics are not surprising since the questionnaire was aimed at individuals who controlled the output of the final product in their respective plants. The research was conducted to uncover the extent to which these leaders knew about TQM and its implementation in their respective plants. The survey also seeks to understand the core elements that were critical in the effective implementation of the system. The study covered respondents from two out of seven plants. Further demographic information is elaborated on as follows:

4.2.1 Respondents Gender

Table 4.1: Distribution of participants according to their gender

Gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	93	92.1	93.0	93.0
	Female	7	6.9	7.0	100.0
	Total	100	99.0	100.0	
Missing	System	1	1.0		
Total		101	100.0		

There were 93% male and 7% female respondents who participated in this research. The total number of participants were 100, with 1 member's gender unidentified.

4.2.2 Age Groups

Table 4.2: Distribution of participants according to their age

Age					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20 - 24	1	1.0	1.0	1.0
	25 - 30	18	17.8	18.2	19.2
	31 - 35	17	16.8	17.2	36.4
	36 - 40	21	20.8	21.2	57.6
	above 40	42	41.6	42.4	100.0
	Total	99	98.0	100.0	
Missing	System	2	2.0		
Total		101	100.0		

The age group which dominated in this research were individuals above 40 years old, with 42.4% of them participating in answering the questionnaire. Individuals between the ages of 36-40 were the second highest in their participation, with 21%. There were 17.2% respondents between the ages of 31-35 and 18.2% between the ages of 25-30. There was an insignificant number of younger respondents who stood at 1%.

4.2.3 Work Experience

Table 4.3: Distribution of participants according to work experience

work experience					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 - 5yrs	6	5.9	5.9	5.9
	6 - 10yrs	36	35.6	35.6	41.6
	11 - 15yrs	14	13.9	13.9	55.4
	16 - 20yrs	16	15.8	15.8	71.3
	over 20yrs	29	28.7	28.7	100.0
	Total	101	100.0	100.0	

More than half of the respondents (58.4%) who participated in the research had more than 10 years of work experience in the company. Another significant number of participants (35.6%) had work experience of between 6-10 years. This indicates that the people in leadership positions had sufficient work experience in the company to enable them to provide informed responses, with 28.7% of them in possession of more than 20 years experience.

4.2.4 Level of Education

Table 4.4: Distribution of participants according to their qualifications

Level of education					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Matric	36	35.6	36.0	36.0
	Post Matric certificate	10	9.9	10.0	46.0
	Trade test	8	7.9	8.0	54.0
	Diploma	30	29.7	30.0	84.0
	Degree	9	8.9	9.0	93.0
	Other	7	6.9	7.0	100.0
	Total	100	99.0	100.0	
Missing	System	1	1.0		
Total		101	100.0		

Most of the participating leaders (92%) had a minimum educational qualification of a matric certificate. Of these leaders, 29.7% had a diploma and only 8.9% with a higher qualification.

4.2.5 Work Area

Table 4.5: Distribution of participants according to work area

Plant					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Press	23	22.8	22.8	22.8
	Weld	78	77.2	77.2	100.0
	Total	101	100.0	100.0	

The research was conducted in two plants, namely Press and Weld Plants. The results show that a large percentage (77.2%) of respondents were from the Weld Plant. Press Plant respondents contributed 22.8% of the questionnaires received. The Weld Plant represents one out of two major assembly plants, hence the higher number of respondents. Press Plant represent one out of two Supplier Plants to the Weld Plant.

4.2.6 Department

Table 4.6: Distribution of participants according to their Plant Departments

Section/ Department					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Production	58	57.4	57.4	57.4
	Quality	11	10.9	10.9	68.3
	Logistics	12	11.9	11.9	80.2
	Maintenance	13	12.9	12.9	93.1
	Engineering	7	6.9	6.9	100.0
	Total	101	100.0	100.0	

All the relevant plant departments in the manufacturing process were represented in the survey. As in many automotive manufacturing companies, the majority of the staff involved in the process are production members. The rest of the staff members act as support to production. In this survey production members made up 57.4% of the total respondents, the rest were made up of supporting departments.

4.2.7 Shift

Table 4.7: Distribution of participants according to shift

Shift					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	White	35	34.7	35.4	35.4
	Yellow	41	40.6	41.4	76.8
	Straight	23	22.8	23.2	100.0
	Total	99	98.0	100.0	
Missing	System	2	2.0		
Total		101	100.0		

The company shift patterns consist of 3 units. Two shifts (White and Yellow) alternate between day and night on a weekly basis. One shift (Straight) only operates during the day. According to the survey 35.4% of the respondents were from white shift, 41.4% from yellow and 23.2% from the straight shift.

4.2.8 Position

Table 4.8: Distribution of participants according to their Position in the company

Current position					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Team Leader	51	50.5	51.0	51.0
	Group Leader	27	26.7	27.0	78.0
	Technical Specialist	3	3.0	3.0	81.0
	Engineer	8	7.9	8.0	89.0
	Manager	6	5.9	6.0	95.0
	Other	5	5.0	5.0	100.0
	Total	100	99.0	100.0	
Missing	System	1	1.0		
Total		101	100.0		

The survey revealed that the majority of the participants were team leaders which made up 51% of the respondents. Group Leaders made up 27%, Engineers and Managers made up 8% and 6% respectively. These results also confirm that the majority of the people involved in the study were the people directly involved in leading the manufacturing process in the company. These are the people who work with shop floor employees on a day-to-day basis. They are the people responsible for making sure that the quality output of the company's products is constantly maintained.

4.3 TQM Principles Adoption

The following tables and graphs describe how respondents perceived the actual application of the six TQM principles in this automotive manufacturing company.

4.3.1 Top Management Commitment

Table 4.9: Distribution of frequencies concerning views on TMC.

Statements	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Senior Management are actively involved in establishing and communicating the organisation quality goals, plans and visions	4.2	8.3	21.9	35.4	30.2
Senior Management anticipate work Process changes and make plans to accommodate it	3.1	13.3	20.4	36.7	26.5
Senior Management allocate adequate resources towards employee education	10.1	21.2	20.2	28.3	20.2
Senior Management view quality as being more important than meeting production schedules	17.5	18.6	23.7	19.6	20.6
All departments heads within our company accept their responsibility for quality	12.1	12.1	20.2	33.3	22.2
Top Management strongly empowers and encourages employee involvement in quality	6.1	13.3	18.4	37.8	24.5

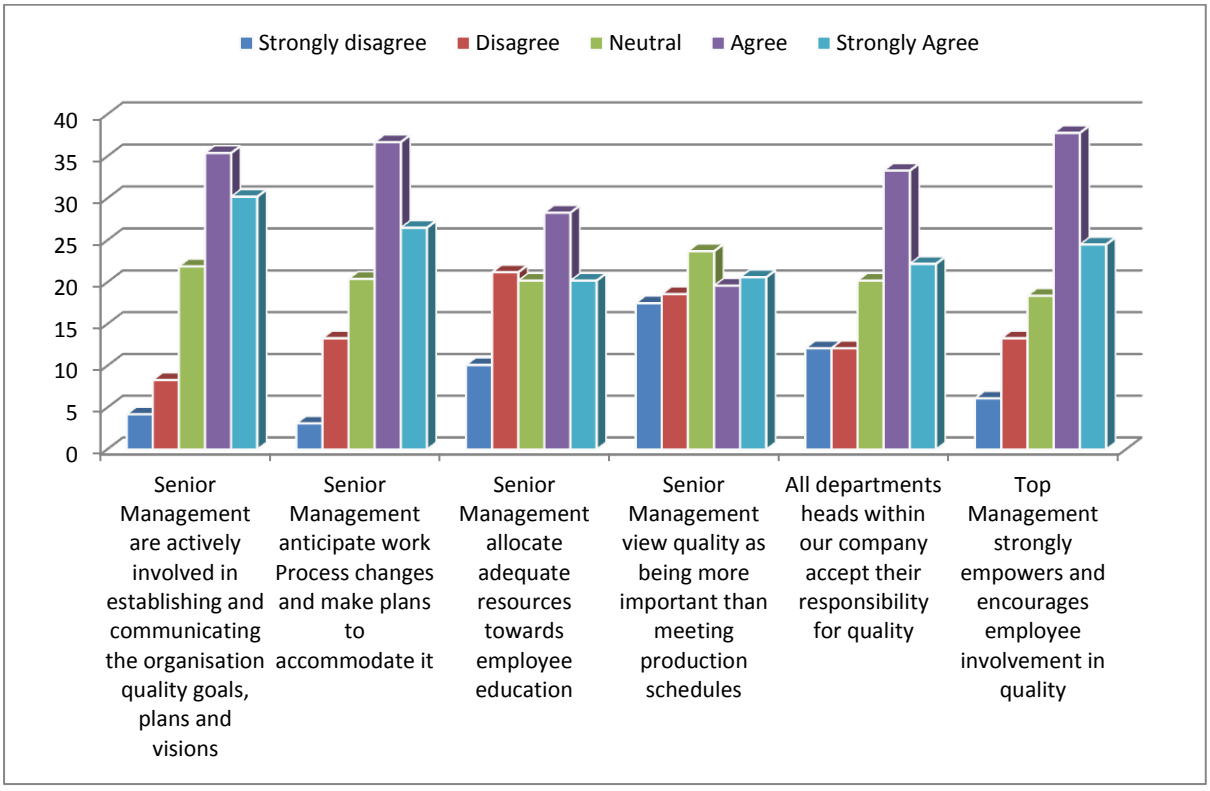

Figure 4.1: Distribution of frequencies (%) of the views concerning TMC.

From the responses given by Table 4.9 and Figure 4.1 it can be seen that most participants agreed on the role of senior management commitment in supporting TQM except on the perception that senior management viewed quality as more important than meeting production schedules. The responses showed mixed reaction among participants with the highest percentage (17.5%) of respondents in strong opposition to the statement and the highest percentage (23.7%) of people not willing to voice their views. On resource allocation, there were also mixed reactions with many respondents opting to disagree (21.2%) and others remaining neutral (20.2%). This significantly reduced the overall view of people who saw management as supportive to educational resource allocation. However in general terms these statements were viewed in a positive light.

4.3.2 Employee Involvement

Table 4.10: Distribution of frequencies concerning views on EI.

Statements	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Management encourages and recognise team-work	9.2	8.2	19.4	38.8	24.5
Employees are involved in decision making and are made responsible for taking action	12.9	18.8	20.8	30.7	16.8
Employees are actively involved in quality related activities such as QC circles	3.0	9.0	20.0	29.0	39.0
Employees suggestions are implemented after an evaluation	4.0	9.0	25.0	35.0	27.0
Employee are very committed to the success of our plant	7.2	13.4	37.1	26.8	15.5
Reporting work problems is encouraged in our firm	4.1	3.1	18.6	36.1	38.1

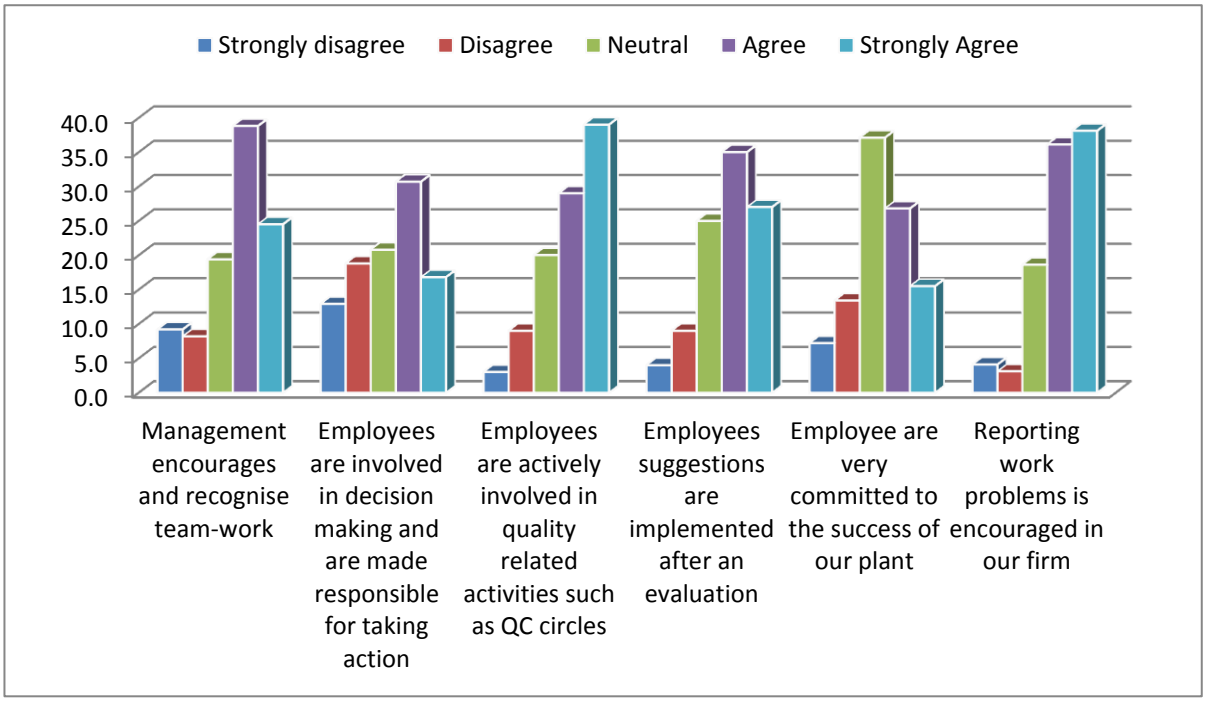

Figure 4.2: Distribution of frequencies (%) of the views concerning EI.

Reporting work problems and involving employees in activities such as QC circles seems to be highly valued in the company. This is seen by a respective 74.2% and 68% of respondents unequivocally agreeing with these statements. Teamwork seems to be fairly encouraged (63.3%) and suggestions implemented (62%). This is also witnessed by a cumulative agreement to the statement. There were mixed reactions to employee commitment to the company with many respondents choosing to be neutral (37.1%), the highest of all neutral responses. Involving employees in decision-making also met with ambiguous reactions, invoking the highest percentage of people who strongly disagreed (13%) while placing the percentage of respondents who cumulatively agreed at 47.5%.

4.3.3 Customer Focus

Table 4.11: Distribution of frequencies concerning views on CF.

Statements	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Our service/product are based on meeting the needs of the customer	1.0	2.0	11.2	28.6	57.1
Customer relationship and partnership are regarded as important in our organization	2.0	2.0	20.4	25.5	50.0
Our plant responds quickly to customer complains	3.1	6.1	19.4	21.4	50.0
Communication and training process emphasize on customer focus	1.0	7.1	26.3	30.3	35.4
We record and review customer complains on a regular basis	3.0	11.0	26.0	29.0	31.0
Customer focused strategies and approaches are continuously reviewed	4.1	9.2	22.4	32.7	31.6

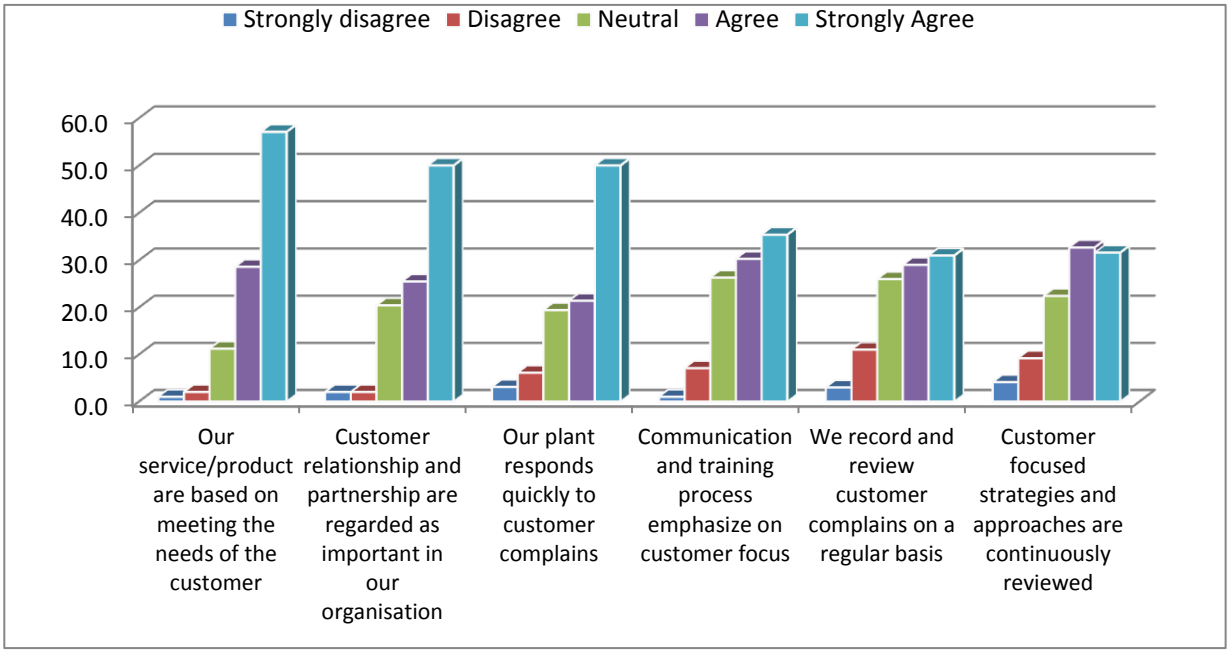

Figure 4.3: Distribution of frequencies (%) of the views concerning CF.

In general the majority of the respondents viewed the company as being customer focused. This is seen by the low percentage of respondents who were in complete opposition to the statements. Although some participants maintained anonymous responses throughout, the overall majority expressed a cumulative agreement to all statements.

4.3.4 Empowerment and motivation

Table 4.12: Distribution of frequencies concerning views on E & M.

Statements	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
We have a transparent and effective appraisal system for recognizing and rewarding employees	22.4	15.3	28.6	22.4	11.2
Employees are encouraged to accept education and training in our organization	4.1	14.3	15.3	37.8	28.6
Employees are trained to perform more than one job to expand their skill levels	4.1	9.2	25.5	29.6	31.6
Excellent suggestions are financially awarded	10.3	10.3	16.5	29.9	33.0
Position promotions are based on work quality in our plant	25.5	22.4	31.6	15.3	5.1
Employees are regarded as valuable, long term resources worthy of receiving education and training throughout their career	12.4	14.4	30.9	27.8	14.4

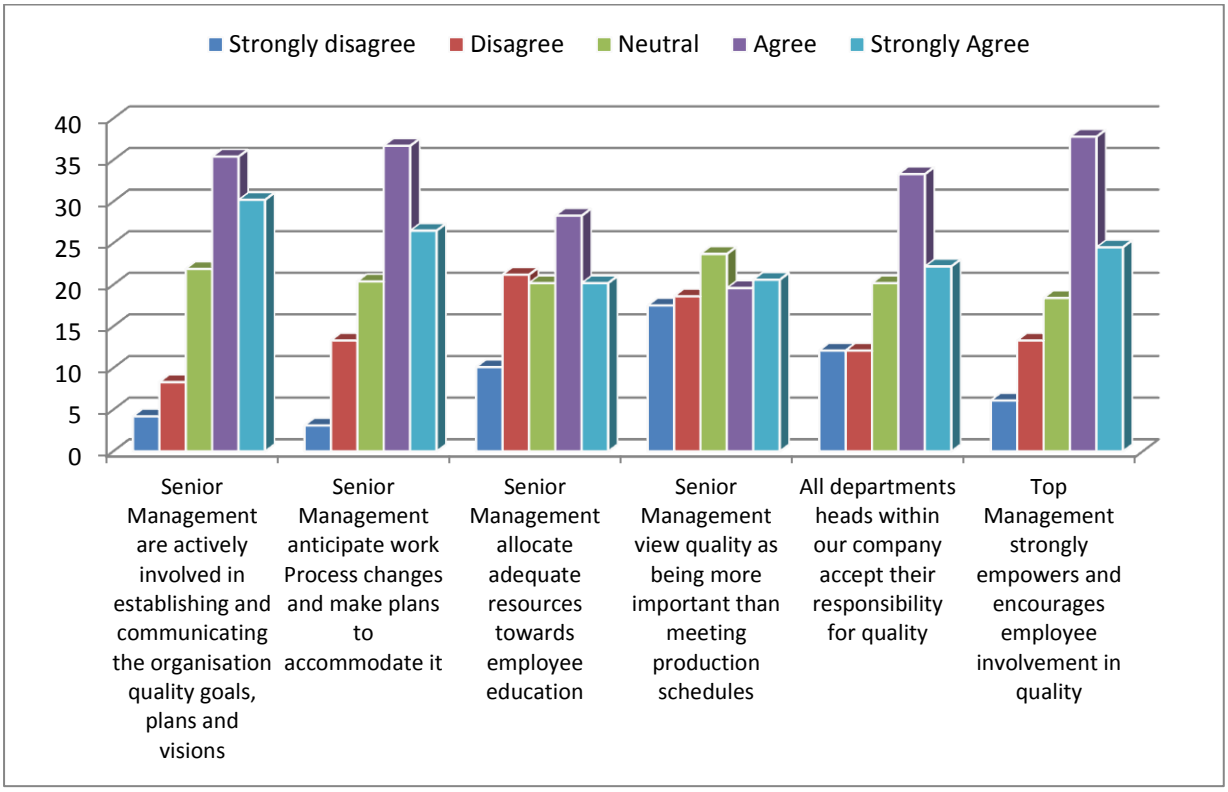

Figure 4.4: Distribution of frequencies (%) of the views concerning E & M.

The overall impression given by respondents with regards to empowerment and motivation was mixed. Respondents showed strong disapproval of the statements regarding the transparency of the company's appraisal systems and the company's system of promotion. In both these statements there were high numbers of neutral responses 28.6% and 31.6%, while cumulatively disagreeing (37.7% & 47.9%) statements outweighed cumulatively agreeing (33.6% & 20.4%) ones. There was a general acceptance by respondents toward training offered by the company and a sense of uncertainly about the company's view of them as long-term resources.

4.3.5 Process Management

Table 4.13: Distribution of frequencies concerning views on PM.

Statements	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Our work process is kept neat and clean at all times	8.2	13.3	26.5	36.7	15.3
We keep updated records of all quality related issues in our plant	4.0	10.0	21.0	36.0	29.0
Work equipment is well maintained according to plan in our plant	9.1	16.2	31.3	27.3	16.2
Inspection standards are applied effectively in our plant to allow detection of potential defective material	5.1	17.3	20.4	37.8	19.4
Monitoring and inspection is done according to documented procedures	4.1	9.2	28.6	32.7	25.5
We have a standard procedure to ensure that defective materials are not used in any process of production in our plant	5.1	8.1	20.2	37.4	29.3

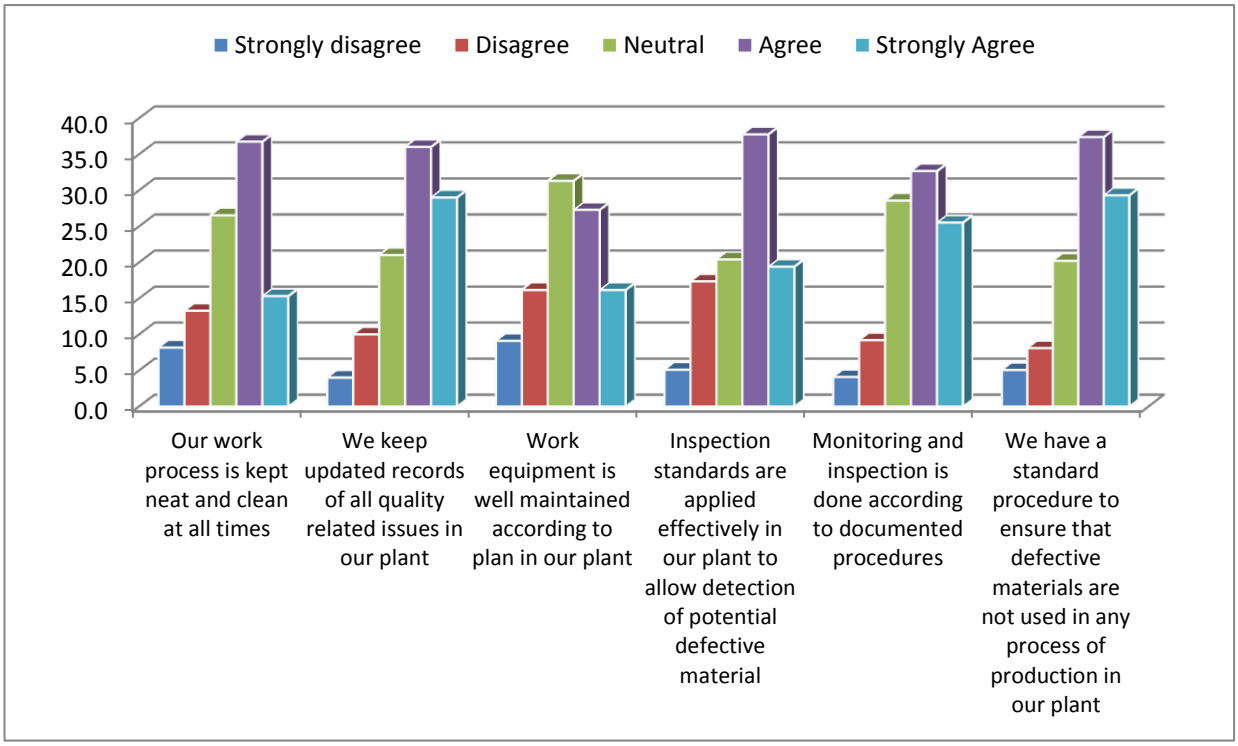

Figure 4.5: Distribution of frequencies (%) of the views concerning PM

The general perception of process management was positive. This implies that the majority of participants view production and quality departments as doing fairly in applying best practices to manage quality outputs in their plants. In all cases respondents' cumulative agreement outweighed cumulative disagreement. However a fair number of respondents gravitated towards not endorsing maintenance as working towards a planned schedule. This is seen by most respondents opting to be neutral (33.3%), the highest neutral response in all statements. However cumulatively, once again the positive outweighed the negative responses.

4.3.6 Continuous Improvement

Table 4.14 Distribution of frequencies concerning views on CI.

Statements	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Our organisation encourages continual changes and try-outs to improve process	5.1	9.1	18.2	32.3	35.4
We frequently measure the product quality that is received by our plants and the product quality sent to our customers	6.1	9.1	21.2	28.3	35.4
Cost implications of defective products created by our internal processes are continuously updated	13.7	14.7	29.5	23.2	18.9
Our decisions regarding quality improvement is always based on objective data	4.2	7.4	25.3	34.7	28.4

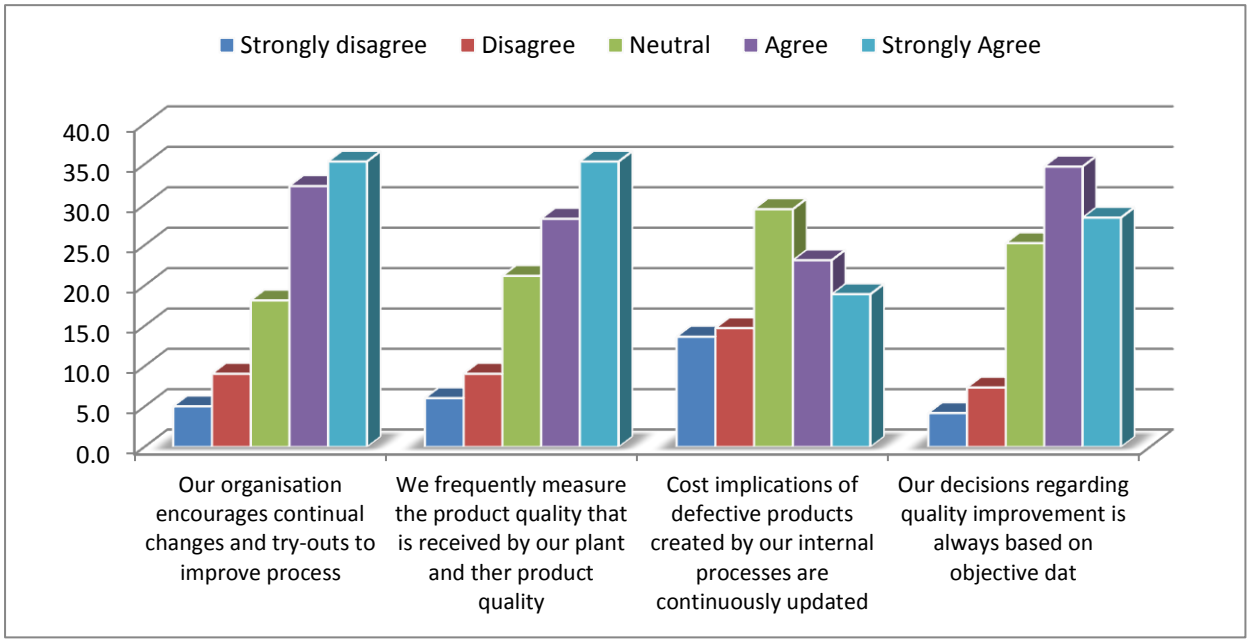

Figure 4.6: Distribution of frequencies (%) of the views concerning CI

Participants' views on shop-floor activities reflected general approval. There were no doubts about the organisation being continuously prepared for changes to improve quality, with 67.7% responses cumulatively agreeing to the statement. Material quality received and product quality performance was generally known (63.7%, cumulatively) by most respondents in the survey. Most participants (63.1%) considered that all decisions on quality were based on objective data. Cost implications of defects were met with mixed reactions. Most respondents opted not

to comment on this issue, prompting the highest neutral (14.7%) responses in all statements. Respondents who cumulatively agreed with the statement made up 42.1% and respondents who totally disagreed made up 28.4%, the highest in all cumulative disagreements.

4.4 Mean comparison between perceived implementation of the TQM and Perceived importance of each principle

This section sought to verify whether or not the company views the six principle of the TQM as a means to improve the business. In other words it enables the researcher to see if respondents perceived the importance of the TQM.

In the questionnaire respondents were also asked to judge the level of perceived importance of TQM for the company. The tables and graphs below summarise and compare the mean scores between the practices of the TQM principles and their perceived importance.

4.4.1 Total Management Commitment

Table 4.15: Means of Practice and Importance related to TMC.

TQM Elements	Statements	Practice	Importance	Variance
Top Management Commitment	Senior Management are actively involved in establishing and communicating the organisation quality goals, plans and visions	3.79	4.31	0.52
	Senior Management anticipate work Process changes and make plans to accommodate it	3.7	4.24	0.54
	Senior Management allocate adequate resources towards employee education	3.27	4.2	0.93
	Senior Management view quality as being more important than meeting production schedules	3.07	4.18	1.11
	All departments heads within our company accept their responsibility for quality	3.41	4.38	0.97
	Top Management strongly empowers and encourages employee involvement in quality	3.61	4.4	0.79
Average mean		**3.48**	**4.29**	**0.81**

From the results in Table 4.15 it can be deduced that respondents had a critical view of senior management's stance about viewing quality as more important than meeting production schedules. This is seen in the large mean variance (1.11) between what respondents deem as the current condition (Practice) and the ideal condition (Importance). Respondents also considered that departments' leadership were not doing enough to accept responsibility for quality. There was also a general view that management can do more to allocate resources to employee education.

4.4.2 Employee Involvement

Table 4.16: Means of Practice and Importance related to EI.

TQM Elements	Statements	Practice	Importance	Variance
Employee Involvement	Management encourages and recognize team-work	3.61	4.45	0.84
	Employees are involved in decision making and are made responsible for taking action	3.2	4.11	0.91
	Employees are actively involved in quality related activities such as QC circles	3.92	4.44	0.52
	Employees suggestions are implemented after an evaluation	3.72	4.33	0.61
	Employee are very committed to the success of our plant	3.3	4.21	0.91
	Reporting work problems is encouraged in our firm	4.01	4.53	0.52
Average mean		**3.63**	**4.35**	**0.72**

Respondents expressed the need for employees to be involved in decision making and to be given the opportunity to take action themselves. The variance between the current practice and the perceived importance stood at 0.91. These factors and others discussed in this section need to be considered if the company is to try to improve commitment of employees to the company, as the variance between current and what is deemed as possible sits also at 0.91.

4.4.3 Customer Focus

Table 4.17: Means of Practice and Importance related to CF.

TQM Elements	Statements	Practice	Importance	Variance
Customer Focus	Our service/product are based on meeting the needs of the customer	4.39	4.75	0.36
	Customer relationship and partnership are regarded as important in our organisation	4.19	4.63	0.44
	Our plant responds quickly to customer complains	4.09	4.64	0.55
	Communication and training process emphasize on customer focus	3.92	4.53	0.61
	We record and review customer complains on a regular basis	3.74	4.58	0.84
	Customer focused strategies and approaches are continuously reviewed	3.79	4.59	0.80
Average mean		**4.02**	**4.62**	**0.60**

Once again, the company's customer focus strategies seem to be satisfactory according to respondents. There were no alarming variances to be critical of, except to encourage consistency in recording and reviewing customer complaints on a continuous basis.

4.4.4 Empowerment & Motivation

Table 4.18: Means of Practice and Importance related to E & M.

TQM Elements	Statements	Practice	Importance	Variance
Empowerment and Motivation	We have a transparent and effective appraisal system for recognizing and rewarding employees	2.85	4.18	1.33
	Employees are encouraged to accept education and training in our organization	3.72	4.44	0.72
	Employees are trained to perform more than one job to expand their skill levels	3.76	4.55	0.79
	Excellent suggestions are financially awarded	3.65	4.44	0.79
	Position promotions are based on work quality in our plant	2.52	3.67	1.15
	Employees are regarded as valuable, long term resources worthy of receiving education and training	3.18	4.17	0.99
Average mean		**3.28**	**4.24**	**0.96**

As has been discussed before, respondents were very critical about the company's appraisal system as the basis on which employees were promoted. These mean variances were at an all-time high of 1.33 and 1.15 respectively. This implies that participants considered that there was a great deal that needed to be done to address these issues. These may be regarded as some of the matters that may contribute to the feeling employees have of not being valued by the company, as the variance stood at 0.99.

4.4.5 Process Management

Table 4.19: Means of Practice and Importance related to PM.

TQM Elements	Statements	Practice	Importance	Variance
Process Management	Our work process is kept neat and clean at all times	3.38	4.48	1.10
	We keep updated records of all quality related issues in our plant	3.76	4.57	0.81
	Work equipment is well maintained according to plan in our plant	3.25	4.38	1.13
	Inspection standards are applied effectively in our plant to allow detection of potential defective material	3.49	4.43	0.94
	Monitoring and inspection is done according to documented procedures	3.66	4.44	0.78
	We have a standard procedure to ensure that defective materials are not used in any process of production in our plant	3.78	4.54	0.76
Average mean		**3.55**	**4.47**	**0.92**

Respondents were generally content with the way the process was managed, as witnessed previously. In this case they continued to voice the need to do more in order to obtain ideal conditions. Respondents felt a strong need for equipment to be maintained according to plan. This is seen by the lowest mean attributed to the current practice (3.25) as opposed to the importance (4.38) they attributed to this service. Respondents also expressed the need to improve workplace tidiness at all times. Respondents were not satisfied with the inspection standards of supplier material. This was seen by the variance between the current practice (3.49) and the expressed importance (4.43) associated with this practice.

4.4.6 Continuous Improvement

Table 4.20: Means of Practice and Importance related to CI.

TQM Elements	Statements	Practice	Importance	Variance
Continuous Improvement	Our organisation encourages continual changes and try-outs to improve process	3.84	4.6	0.76
	We frequently measure the product quality that is received by our plant and.	3.78	4.55	0.77
	Cost implications of defective products created by our internal processes are continuously updated	3.19	4.41	1.22
	Our decisions regarding quality improvement are always based on objective data	3.76	4.39	0.63
Average mean		**3.62**	**4.48**	**0.86**

Respondents continued to stress the importance of knowing the cost implications of defective products created by internal processes. The variance of means (1.22) between the current practice and the importance attributed to this was significant.

On all TQM elements participants expressed a need for improvement. This is indicated by the average mean variances, which show a positive average for all elements. The most noticeable was on Empowerment and Motivation which had an average mean variance of 0.96 followed by Process Management with 0.92. According to respondents, the current practices of these TQM elements need significant improvement.

4.5 Assessment of the level of TQM Knowledge

4.5.1 TQM awareness within management

In section B of the questionnaire a question was asked to check whether respondents were aware of TQM or not. Table 4.21 presents the responses of participants.

Table 4.21: Descriptive statistics of participants' knowledge of TQM.

Have you heard about the TQM					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	68	67.3	69.4	69.4
	No	30	29.7	30.6	100.0
	Total	98	97.0	100.0	
Missing	System	3	3.0		
Total		101	100.0		

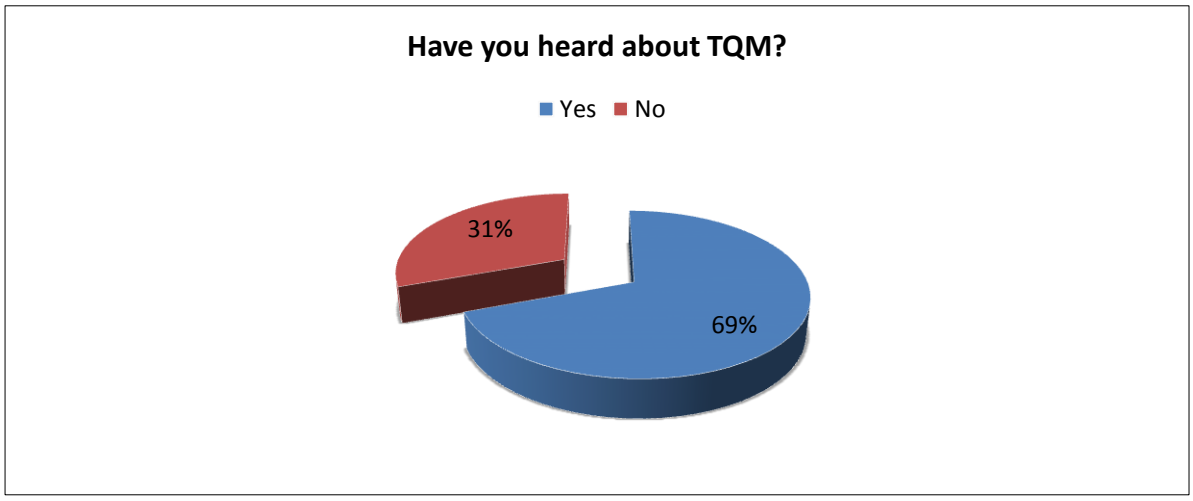

Figure 4.7: Total percentage of people who said they knew about TQM

Many respondents (69%) stated that they knew about TQM when asked, this is reflected in Figure 4.7. Only 31% stated that they never heard about the concept of TQM. Table 4.22 shows cross-tabulation between the awareness of TQM and demographics such as work experience, level of education, plant, Department, shift and current position. This provided knowledge of the exact percentage of different groups that claimed to be aware of TQM. It also indicated whether or not there is a relationship between these demographic variables and their claim regarding TQM.

Table 4.22: Chi-square test for independence between demographics and TQM awareness

Demographics variable	Asymp.Sig (2-sided)*	Phi(Cramer's V)	X^2	Conclusion
Work experience	.213	.244	5.81	Not Sig
Level of education	.019	.374	13.57	Significant
Plant	.762	-.031	.001	Not Sig
Section/Department	.409	.201	3.975	Not Sig
Shift	.245	.171	2.814	Not Sig
Current position	.003	.431	18.053	Significant

Table 4.22 found that there was a relationship between the level of education and current positions with the awareness of TQM. Table 4.23 and 4.24 elaborates more about on these two demographics' awareness of TQM.

Table 4.23: Relationship between current position and TQM awareness.

Crosstab: Awareness TQM/ Current position					
			Have you heard about the TQM		Total
			Yes	No	
Current position	Team Leader	Count	30	20	50
		% of Total	30.9%	20.6%	51.5%
	Group Leader	Count	24	2	26
		% of Total	24.7%	2.1%	26.8%
	Technical Specialist	Count	0	2	2
		% of Total	0.0%	2.1%	2.1%
	Engineer	Count	6	2	8
		% of Total	6.2%	2.1%	8.2%
	Manager	Count	6	0	6
		% of Total	6.2%	0.0%	6.2%
	Other	Count	2	3	5
		% of Total	2.1%	3.1%	5.2%
Total		Count	68	29	97
		% of Total	70.1%	29.9%	100.0%

According to Table 4.23 all the manager participants are aware of the TQM (6/6). Between the two technical specialists who filled in the questionnaire, neither of them was aware of the TQM. Out of 26 Group leaders who answered the question only two stated they did not know TQM and out of 50 team leaders who answered the questionnaire 20 stated that they had never heard of TQM before. The graph bellow illustrates the situation.

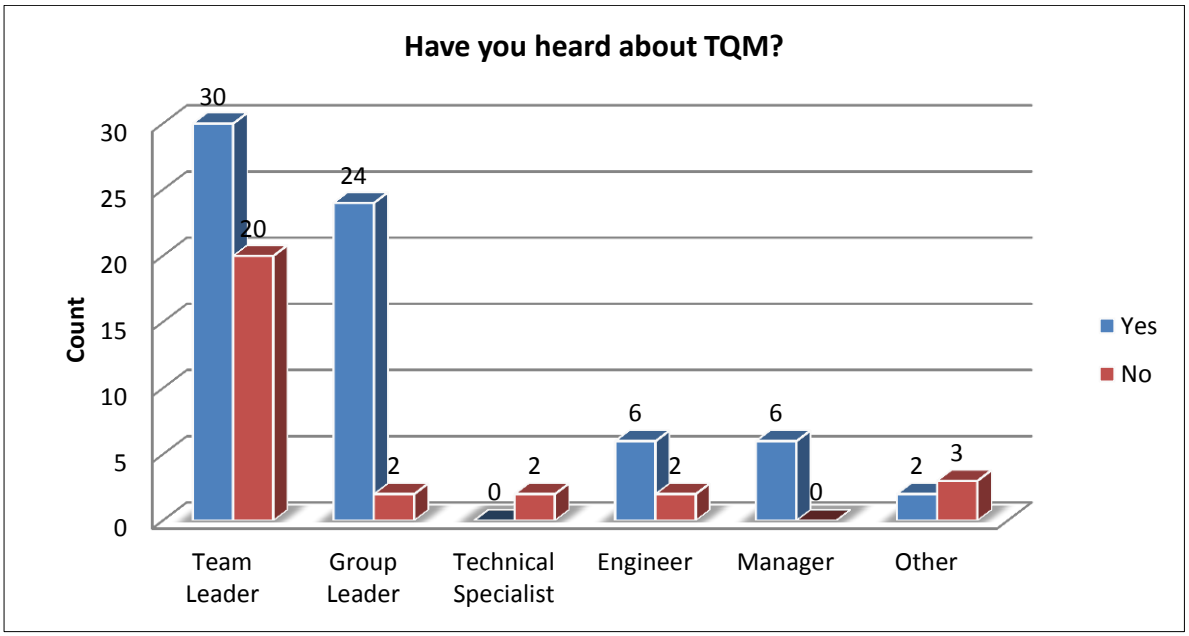

Figure 4.8: Relationship between current position and TQM awareness.

In the same way the level of education was related to the awareness of TQM principles. Table 4.24 and Figure 4.9 illustrate the relationship between the two.

Table 4.24: Relationship between level of education and TQM awareness.

Crosstab: Awareness TQM/ Level of education					
			Have you heard about the TQM		Total
			Yes	No	
Level of education	Matric	Count	22	13	35
		% of Total	22.7%	13.4%	36.1%
	Post Matric certificate	Count	6	4	10
		% of Total	6.2%	4.1%	10.3%
	Trade test	Count	2	4	6
		% of Total	2.1%	4.1%	6.2%
	Diploma	Count	28	2	30
		% of Total	28.9%	2.1%	30.9%
	Degree	Count	6	3	9
		% of Total	6.2%	3.1%	9.3%
	Other	Count	4	3	7
		% of Total	4.1%	3.1%	7.2%
Total		Count	68	29	97
		% of Total	70.1%	29.9%	100.0%

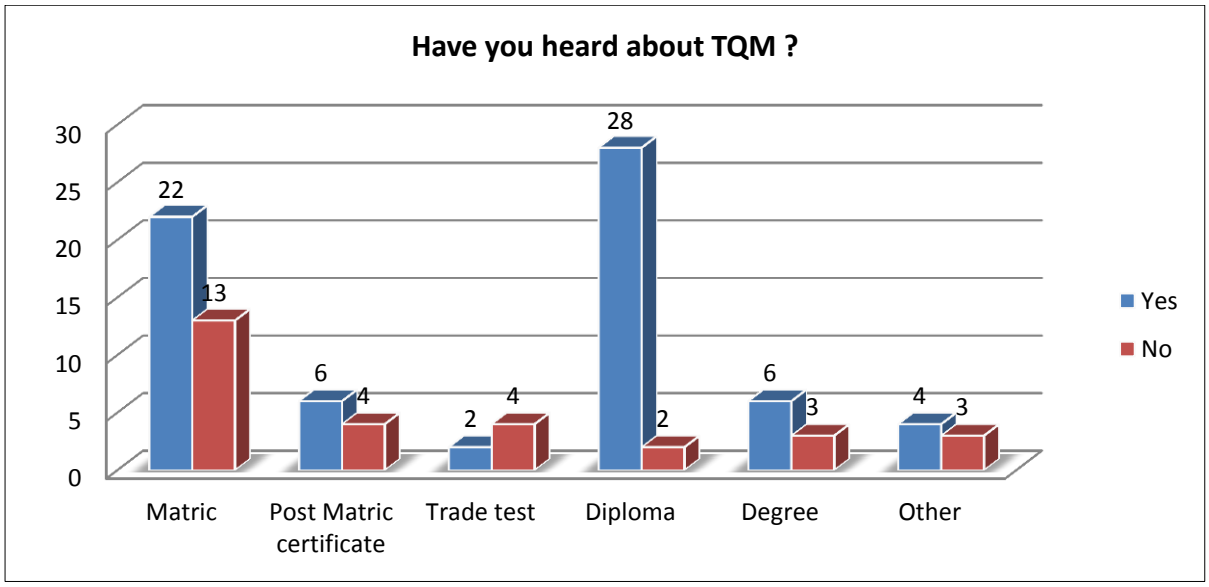

Figure 4.9: Relationship between education and TQM awareness.

Table 4.24 and Figure 4.9 indicate that employees who hold a diploma are more aware of the TQM. Among the 30 employees having a diploma, 28 were aware of the TQM and 2 were not aware of it.

Overall, the number of respondents (69%) who claimed they heard about TQM were not enough to conclude that the level of the knowledge of TQM principles was sufficient within the leadership of the company. A second question inquired into what respondents knew about TQM so as to check the accuracy of their knowledge. The responses ranged from: insufficient knowledge (1); average knowledge (2), and Good knowledge (3). Table 4.25 and Figure 4.10 below describe the accuracy of knowledge about TQM principles.

Table 4.25: Respondents accuracy about the knowledge of TQM

What do you know about TQM?				
		Frequency	Percent	Valid Percent
Valid	Insufficient knowledge	22	21.8	38.6
	Average knowledge	27	26.7	47.4
	Good knowledge	8	7.9	14.0
	Total	57	56.4	100.0
	Missing	44	43.6	
Total		101	100.0	

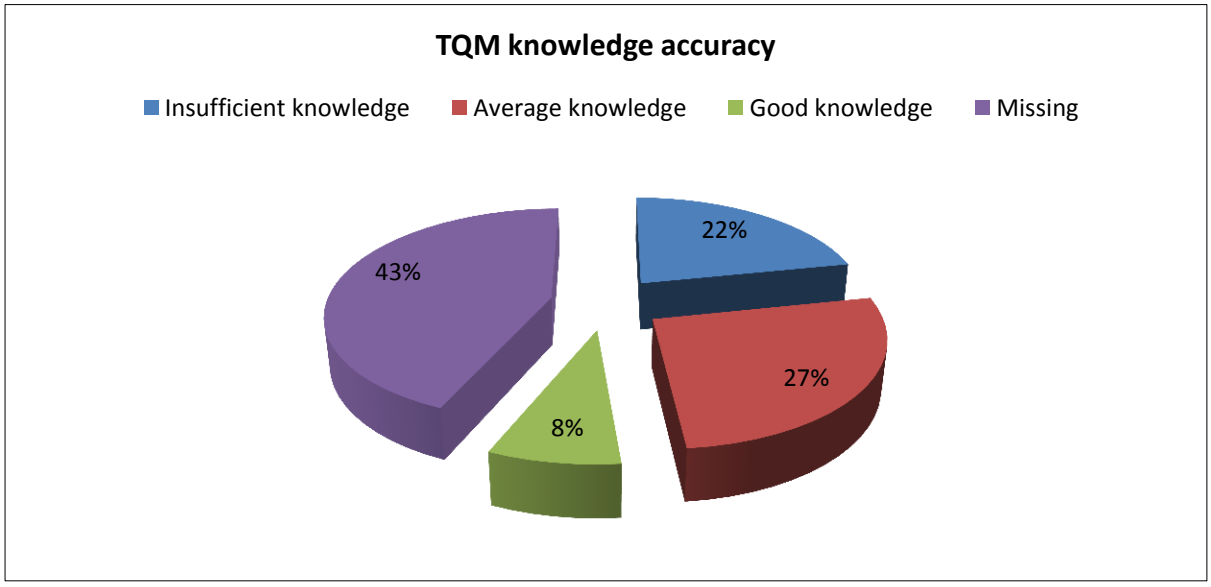

Figure 4.10: Percentage break-down of respondents' accuracy of TQM knowledge.

According to Table 4.25 there were many missing values (44) which indicated the number of people who did not answer the question raised, most probably because they could not find an appropriate definition for TQM. These respondents made up a total of 43% of participants who did not provide an opinion of what they thought TQM was. From Figure 4.10, only 8% of the people provided a correct definition of the

TQM. There were 27% of the employees who claimed to know TQM and provided a fairly accurate answer; whereas 22% gave an inaccurate answer.

To push the analysis further, a cross tabulation was performed to identify if there was any relationship between employees with better knowledge of TQM and their level of education or current position. Table 4.26 demonstrates this.

Table 4.26: Chi-square test for independence between TQM knowledge and educational level and current position

Demographics variable	Asymp.Sig (2-sided)*	Phi(Cramer's V)	X2	Conclusion
Level of education	.725	.351	7.006	Not Sig
Current position	.912	.242	3.333	Not Sig

According to Table 4.26 there was no significant relationship between employees who possessed accurate TQM knowledge and the level of their education or position. This can be also be explained by the low sample size of respondents who answered this question (N=57). The tables below describe the percentages partition of each group.

Table 4.27: Relationship between current position and TQM knowledge.

Crosstab: Knowledge about TQM / Current position						
			What do you know about TQM			Total
			insufficient knowledge	average knowledge	Good knowledge	
Current position	Team Leader	Count	9	11	5	25
		% of Total	15.8%	19.3%	8.8%	43.9%
	Group Leader	Count	9	9	1	19
		% of Total	15.8%	15.8%	1.8%	33.3%
	Engineer	Count	1	3	1	5
		% of Total	1.8%	5.3%	1.8%	8.8%
	Manager	Count	2	3	1	6
		% of Total	3.5%	5.3%	1.8%	10.5%
	Other	Count	1	1	0	2
		% of Total	1.8%	1.8%	0.0%	3.5%
Total		Count	22	27	8	57
		% of Total	38.6%	47.4%	14.0%	100.0%

Interestingly, only 1.8% of manager (1/ 6) had a good knowledge of TQM. This shows that the company needs to invest more effort in making the system apparent to its management. Table 4.28 shows a breakdown of TQM knowledge against respondents' educational level

Table 4.28: Relationship between level of education and TQM knowledge.

Level of education * What do you know about TQM Cross-tabulation						
			What do you know about TQM			Total
			insufficient knowledge	average knowledge	Good knowledge	
Level of education	Matric	Count	7	7	2	16
		% of Total	12.3%	12.3%	3.5%	28.1%
	Post Matric certificate	Count	2	4	0	6
		% of Total	3.5%	7.0%	0.0%	10.5%
	Trade test	Count	1	1	0	2
		% of Total	1.8%	1.8%	0.0%	3.5%
	Diploma	Count	9	12	4	25
		% of Total	15.8%	21.1%	7.0%	43.9%
	Degree	Count	1	1	2	4
		% of Total	1.8%	1.8%	3.5%	7.0%
	Other	Count	2	2	0	4
		% of Total	3.5%	3.5%	0.0%	7.0%
Total		Count	22	27	8	57
		% of Total	38.6%	47.4%	14.0%	100.0%

Although 69% of respondents initially claimed that they knew TQM, it was later found that only a small portion of respondents (35%) could sufficiently define the concept of the system. It was also later found that there was no significant relationship between respondents who had better knowledge of TQM and the level of their education or position, which was contrary to what the study found by assessment of respondents' initial answers.

4.5.2 TQM Implementation

A number of questions were asked to assess if respondents understood TQM and the principles that are attached to the system. One of the questions was whether or not respondents knew if TQM was already implemented in their company.

Table 4.29: Descriptive statistics of participants' knowledge of TQM implementation in the company.

From your perception has your company implemented the TQM					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	60	59.4	61.2	61.2
	Planned	6	5.9	6.1	67.3
	Discontinued	2	2.0	2.0	69.4
	No	8	7.9	8.2	77.6
	Don't Know	22	21.8	22.4	100.0
	Total	98	97.0	100.0	
Missing	System	3	3.0		
Total		101	100.0		

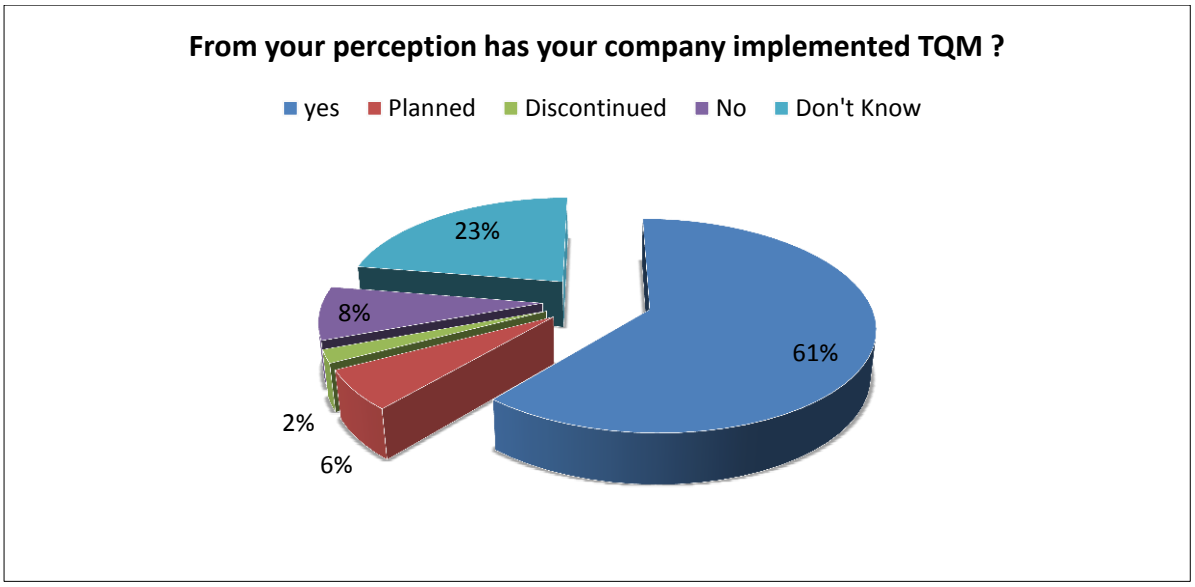

Figure 4.11: Total percentage of employees' opinions about TQM implementation

From Figure 4.11, 61% of the respondents claimed that TQM was already implemented in the company, 23% did not know, 8% stated it was not implemented, 6% said it is planned and 2% said it was discontinued.

4.6 Correlation between variables and Hypotheses Testing

4.6.1 Correlation Tests

The correlation relationship between the six principles of TQM was also evaluated. A positive correlation between two variables means that if one increases the other one also increases. On the other hand, a negative correlation means that if one increase the other one decrease. A value of 0.00 represents a lack of correlation (Abusa, 2011:162). The table below summarized the inter-correlations.

Table 4.30: Correlation between TQM variables

		TMC	EI	CF	E&M	PM	CI
TMC	Pearson Correlation	1	.675**	.584**	.628**	.525**	.570**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
EI	Pearson Correlation		1	.625**	.722**	.644**	.552**
	Sig. (2-tailed)			.000	.000	.000	.000
CF	Pearson Correlation			1	.641**	.693**	.678**
	Sig. (2-tailed)				.000	.000	.000
E&M	Pearson Correlation				1	.694**	.615**
	Sig. (2-tailed)					.000	.000
PM	Pearson Correlation					1	.706**
	Sig. (2-tailed)						.000
CI	Pearson Correlation						1
	Sig. (2-tailed)						
**. Correlation is significant at the 0.01 level (2-tailed).							

From table 4.30 it can be seen that the highest correlation between variables is between Empowerment & motivation (E&M) and Employee Involvement (r=0.722). It is expected that employees who are empowered and motivated may show a high level of involvement in the workplace. The second highest correlation was between process management (PM) and continuous improvement (CI) (r= 0.706). this support

the fact that process management will improve if it is continuously improved. The third highest correlation was between Empowerment & motivation (E&M) and Process Management (PM) (r=0.94).

Overall analyzing these correlations of the six element of the TQM, it appears that there is a multi-correlation. All the correlations are significant and strong (above 0.5); they range from 0.525 to 0.722. This shows that when the company is advanced in the implementation of some of the TQM elements, it tends to be more advanced for the other elements.

Hypothesis 1: Relationship between TMC and IE

There is a very strong positive relationship between TMC and EI (r= 0.675; *p*= 0.000). The more the top management is committed, the more employees are involved. The coefficient of determination was calculated manually (0.675 x 0.675= 0.45). This means that TMC helps to explain about 45% of the variance in respondents' scores on Employee involvement. H1 is therefore verified.

Hypothesis H2 and H3: Relationship between EM /EI and EI/PM

Table 4.28 above shows that *Employee Involvement* had strong relationships with Empowerment and Motivation (E&M) (0.722) and Process Management (PM) (0.644). Thus hypothesis 2 and 3 were also verified.

It should once again be acknowledged that E&M showed the strongest correlation with IE hence a closer look will be taken to study influential elements of IE. To push the analysis further, a regression analysis enabled the researcher to analyse the contribution of each of the aforementioned TQM principles on *Employee Involvement (EI)*.

Regression analysis for 4 TQM elements on EI

A standard multiple regression is used to explain how well Top Management Commitment (TMC), Empowerment and Motivation (E&M), Process Management (PM) and Continuous Improvement (CI) predict employee involvement (EI). A standard multiple regression gives an indication of the relative contribution of these four elements in the variance of Employee involvement. The model summary is presented in Table 4.31.

Table 4.31: Model summary table

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.789[a]	.623	.602	2.95942

a. Predictors: (Constant), TMCPrac, ContImprovPrac, EmpowerMotivPrac, ProcessMangePrac

b. Dependent Variable: EIPrac

Table 4.31 indicates that R = 0.789 which means that there a strong positive relationship between Employee involvement and TMC, Continuous improvement, Empowerment & Motivation, Process Management. R square indicates how much of the variance in *Employee Involvement* is explained by the four predictors above mentioned. Expressed as a percentage, the value 0.623 means that 62.3% of the variance of Employee involvement is explained by the four predictors. Now the question is to know which variable makes a unique contribution in the variance of EI. Table 4.32 and Table 4.33 determines the statistical significance of the result.

Table 4.32: ANOVA

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1028.526	4	257.132	29.359	.000[b]
	Residual	621.829	71	8.758		
	Total	1650.355	75			

a. Dependent Variable: EIPrac

b. Predictors: (Constant), TMCPrac, ContImprovPrac, EmpowerMotivPrac, ProcessMangePrac

The ANOVA table (Table 4.32) shows that the results are significant (p= 0.000 < 0.05).

Table 4.33: Coefficients

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Correlations	
		B	Std. Error	Beta			Partial	Part
1	(Constant)	5.924	1.613		3.673	.000		
	EmpowerMotivPrac	.294	.094	**.329**	3.127	**.003**	.348	.228
	ProcessMangePrac	.131	.096	.146	1.360	.178	.159	.099
	ContImprovPrac	.007	.128	.006	.057	.955	.007	.004
	TMCPrac	.338	.078	**.427**	4.328	**.000**	.457	.315
a. Dependent Variable: EIPrac								

The regression analysis indicates that the variables *Empowerment and Motivation* as well as *Top Management Commitment* make a strong unique contribution in explaining the *employee involvement* (*B= 0.329; B= 0.427*). TMC is the variable that makes the strongest unique contribution to explain *Employee involvement*; in fact it explains approximately 10% (0.315 x 0.315) of the variance in the Employee involvement score. The model equation for the regression analysis of 4 TQM elements on EI is as follows:

EIprac = 5.924 + 0.294 EmpowerMotivPrac + 0.338 TMCprac + 1.613

In conclusion, Employee involvement in this automotive company is predicted by Top Management Commitment (*B*= 0.427) but also by the level of motivation of employees (B= 0.329). However, Process Management does not make a unique contribution in the variance of *Employee involvement.*

Regression analysis for 5 TQM elements on PM

Table 4.34: Model summary table

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.808[a]	.653	**.630**	3.38769

a. Predictors: (Constant), CustfocusPractice, TCMPrac, ContImprovPrac, EmpowerMotivPrac, EIPrac

b. Dependent Variable: ProcessMangePrac

Table 4.35: ANOVA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1659.607	5	331.921	28.922	.000[b]
	Residual	883.688	77	11.476		
	Total	2543.295	82			

a. Dependent Variable: ProcessMangePrac

b. Predictors: (Constant), CustfocusPractice, TCMPrac, ContImprovPrac, EmpowerMotivPrac, EIPrac

Table 4.36: Coefficients

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations		
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part
1	(Constant)	-.140	1.961		-.071	.943	-4.045	3.766			
	EIPrac	.214	.126	.184	1.694	.094	-.038	.466	.644	.190	.114
	TCMPrac	-.089	.093	-.094	-.954	.343	-.275	.097	.525	-.108	-.064
	EmpowerMotivPrac	.271	.113	.260	2.405	**.019**	.047	.496	.694	.264	.162
	ContImprovPrac	.490	.143	**.336**	3.419	**.001**	.204	.775	.706	.363	.230
	CustfocusPractice	.259	.112	.238	2.318	**.023**	.036	.481	.693	.255	.156

a. Dependent Variable: ProcessMangePrac

The model equation for regression analysis for 5 TQM elements on PM is as follows

ProcessMangePrac = - 0.14 + 0.271 EmpowerMotivPrac + 0.490 ContImprovPrac + 0.259 CustFocusPrac + 1.961

The model indicates that 63% of the variance of PM is contributed by the 4 TQM elements. The best predictor for PM is Continuous improvement (beta = 0.336). EI does not make a unique contribution to the variance of PM (H3).

4.7 Application of TQM principles between the shifts, plants and departments

4.7.1 Application of TQM between shifts

One-way between-groups analysis of variance was conducted to explore if TQM was applied differently between the 3 shifts in the company, namely White, Yellow and Straight (not applicable) shift. Table 4.37 explores the variance between Top Management Commitment (TMC) and these three shifts.

- Top Management Commitment

Table 4.37: ANOVA

ANOVA

TMCPrac

`	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	300.459	2	150.229	4.765	.011
Within Groups	2711.339	86	31.527		
Total	3011.798	88			

Table 4.37 shows that there was a statistically difference (*p= 0.011*; F= 4.765). The effect size calculated (manually) presented by the *eta squared* (= 0.1) indicates a medium effect between TMC and the shifts. The multiple comparisons Table 4.38 indicates these differences.

Table 4.38: Post-Hoc Comparison

Multiple Comparisons

Dependent Variable: TMCPrac

Tukey HSD

(I) Shift	(J) Shift	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
White	Yellow	2.96817	1.37678	.085	-.3154	6.2517
	Not applicable	4.79967*	1.60886	.010	.9626	8.6367
Yellow	White	-2.96817	1.37678	.085	-6.2517	.3154
	Not applicable	1.83150	1.51976	.453	-1.7931	5.4561
Not applicable	White	-4.79967*	1.60886	.010	-8.6367	-.9626
	Yellow	-1.83150	1.51976	.453	-5.4561	1.7931

*. The mean difference is significant at the 0.05 level.

From the Table 4.38 Post-hoc comparisons using the Tukey HSD test indicated that the mean score for Shift that identified as *Not Applicable(Straight Shift)* was significantly different from the shift *White (p=0.01)*. There is a medium effect within the shift groups concerning TMC application in the company. This indicates that employees in the white shift held a better perception of TMC than employees from the straight shift. The reason for this perception may be attributed to demand for the product. Since one straight shift and the two other shifts focus on completely different products. Commitment from top management may also vary accordingly.

Table 4.39 summarizes the results of ANOVA for the six principles of TQM. As can be seen, there was no significant difference between the other TQM elements' application on different shifts.

Table 4.39: ANOVA Summary

Principles	F	*P*	Conclusion
Employee Involvement	.571	.567	Not significant
Customer Focus	.640	.529	Not significant
Empowerment and Motivation	1.56	.214	Not significant
Process Management	.591	.556	Not significant
Continuous improvement	1.819	.168	Not significant

4.7.2 Application of TQM between Departments

A one-way ANOVA is used to compare the variability in scores in application of TQM between the different departments: Table 4.40 explores the variance between Top Management Commitment (TMC) and the various shifts.

- Top Management Commitment

Table 4.40: ANOVA

ANOVA

TMC

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	565.421	4	141.355	4.799	.002
Within Groups	2533.041	86	29.454		
Total	3098.462	90			

There was a statistical difference (*p= 0.002*; F= 4.799). The effect size calculated (manually) presented by the *eta squared* (= 0.18) indicates a large effect. Post-hoc comparisons using the Tukey HSD test (Table 4.41) indicated that the mean score for employees from *Production* was significantly different from the department of Quality *(p=0.015)*. The mean difference between Production and Quality is 5.821 > 0; therefore *Production* had a greater perception of TMC practice than *Quality.*

Table 4.41: Post-Hoc Comparison

Multiple Comparisons						
Dependent Variable: TCMPrac						
Tukey HSD						
(I) Section/ Department	(J) Section/ Department	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Production	Quality	**5.82168***	1.80113	.015	.8028	10.8405
	Logistics	4.95299	1.95936	.094	-.5068	10.4127
	Maintenance	1.14744	1.73808	.964	-3.6957	5.9906
	Engineering	6.01648	2.18498	.054	-.0720	12.1049
Quality	Production	**-5.82168***	1.80113	.015	-10.8405	-.8028
	Logistics	-.86869	2.43932	.996	-7.6659	5.9285
	Maintenance	-4.67424	2.26542	.246	-10.9868	1.6383
	Engineering	.19481	2.62399	1.000	-7.1169	7.5066
Logistics	Production	-4.95299	1.95936	.094	-10.4127	.5068
	Quality	.86869	2.43932	.996	-5.9285	7.6659
	Maintenance	-3.80556	2.39315	.508	-10.4741	2.8629
	Engineering	1.06349	2.73503	.995	-6.5577	8.6846
Maintenance	Production	-1.14744	1.73808	.964	-5.9906	3.6957
	Quality	4.67424	2.26542	.246	-1.6383	10.9868
	Logistics	3.80556	2.39315	.508	-2.8629	10.4741
	Engineering	4.86905	2.58112	.332	-2.3233	12.0613
Engineering	Production	-6.01648	2.18498	.054	-12.1049	.0720
	Quality	-.19481	2.62399	1.000	-7.5066	7.1169
	Logistics	-1.06349	2.73503	.995	-8.6846	6.5577
	Maintenance	-4.86905	2.58112	.332	-12.0613	2.3233
*. The mean difference is significant at the 0.05 level.						

Table 4.42: ANOVA Summary

Principles	F	*P*	Conclusion
Employee Involvement	1.081	.371	Not significant
Customer Focus	1.054	.384	Not significant
Empowerment and Motivation	2.632	.038	Significant
Process Management	1.676	.162	Not significant
Continuous improvement	.702	.592	Not significant

Although the ANOVA test between *Empowerment & Motivation* and *Department* is significant as indicated in Table 4.42 (p= 0.038), the post-hoc tests indicate there is no actual difference in mean scores between the departments.

4.7.3 Application of TQM between Plants

Abusa (2011:158) states that a T-test is a useful tool when the goal of the researcher is to compare the means of two groups using the same variable, as in this case TQM. When the value of *F* is large and the *P*-value is less than 0.05 this means that the variances are heterogeneous, which violates the key assumption of the T-test. To test for significant difference in the extent to which TQM was implemented between Yellow and White shift, a T-test was performed.

Table 4.43: T-Test results for TQM elements between two plants

Independent Samples Test								
		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
TMC	Equal variances assumed	.222	.638	.319	89	.750	.46113	1.44382
	Equal variances not assumed			.327	36.851	.745	.46113	1.40970
EI	Equal variances assumed	3.759	.056	-.776	89	.440	-.91304	1.17665
	Equal variances not assumed			-.678	29.365	.503	-.91304	1.34605
Custfocus	Equal variances assumed	2.726	.102	-.920	93	.360	-1.16795	1.26967
	Equal variances not assumed			-.789	26.875	.437	-1.16795	1.47985
Empower& Motive	Equal variances assumed	.936	.336	-1.086	92	.281	-1.39130	1.28168
	Equal variances not assumed			-1.019	33.856	.316	-1.39130	1.36592
ProcessMangmt	Equal variances assumed	.695	.406	-.112	94	.911	-.15009	1.33866
	Equal variances not assumed			-.104	33.184	.918	-.15009	1.43954
ContImprov	Equal variances assumed	9.050	.003	-1.644	92	.104	-1.49235	.90766
	Equal variances not assumed			-1.332	28.347	.193	-1.49235	1.12025

Apart from *Continuous improvement,* the assumption of equal variation was not violated for all the variables because the *p* values from the Levene's test were greater than the cut off of 0.05. For the variable CI, the row '*Equal variances not assumed'* was used.

As indicated in Table 4.43, in assessing TQM as whole, there is no significant difference in its application between these two different plants (Press/ Weld) in the present study.

4.8 Summary

In this study, six management principles were utilised to conceptualise the philosophy of TQM in management practice. These six principles included the role of top management commitment, employee involvement, customer focus, process management, continuous improvement and empowerment & motivation. A research instrument was developed and administered in two plants in an automotive manufacturing company to asses and measure the degree of TQM implementation as well the evaluation of the importance of these principles in achieving quality output. The research instrument was tested for reliability and validity, and was deemed suitable in research to determine the extent of TQM implementation in a manufacturing environment.

The research findings obtained were presented and the extent of TQM implementation was determined and presented. The findings provided several indications of unquestionable progress in the company towards performance excellence such as the level of focus exerted towards satisfying customer needs. The study also highlighted several issues for the company to consider such as the level of TQM education among its leadership. Emphasis was also placed on the need to improve process management and empowerment amongst employees. The findings also showed that there was a strong inter-correlation between TQM elements. An extension in the analysis revealed that for employees to be involved in their respective processes, top management need to show commitment in leading this initiative and that empowerment and motivation must accompany their strategy.

The findings also revealed that overall TQM application between shifts, plants and departments showed no significant differences. Top management was reportedly committed more to meeting production needs than to quality. Employees also expressed the view that top management's commitment was being biased towards the product that showed more sales than towards the product that did not.

Chapter 5: Discussion

5.1 Introduction

The results obtained in chapter four will be discussed in this chapter to answer the research questions outlined in chapter one. This study focused on TQM and its implementation in an automotive manufacturing company which is based in Durban. The automotive sector plays a major role in the economic and social development of South Africa, however to compete successfully on the world market, this sector, more importantly the manufacturing sector, needs to pursue the example of successful organisations and their world-wide systems in order to improve their quality standards and operational performance. Thus the study has sought to reveal the status of TQM implementation in this company, with the aim of providing recommendations for improving management practice to meet proven successful global standards.

5.2 Discussion

A questionnaire was distributed to two manufacturing plants, where respondents from all departments participated in answering the questions. The questionnaire was divided into two sections: section 1: provided the demographic information of the participants, section 2: probed respondents' knowledge about TQM and finally evaluated the extent of TQM implementation, together with their views on its importance in their respective plants. There were six TQM elements that were identified from the literature review and evaluated in this study. These elements were: Top Management commitment, Employee involvement, Customer Focus, Empowerment and Motivation, Process Management and Continuous Improvement.

The respondents who dominated in this study were male (93%) and were from the production department (57%). This distribution is understandable since the automotive manufacturing industry is labour intensive, hence represented by production members who are dominantly male. More than half of half of the respondents had work experience of more than 10 years, with 29% of them in possession of more than 20 years' experience. This implies that the data collected can be deemed as reliable and representative of the views of the general perception

of the management of these two plants where the information was collected. The age group that dominated the study was 40 years and above (42%) followed by persons aged 36-40 representing 21% of the respondents. This means that over 60% of the participants were adults of mature ages. Again this explains the reliability of the data gathered from the study. The following are the summary of the respondents' views with respect to the research questions developed in chapter 1.

5.3 The research questions

Chapter 1 research questions are stated below:

- To what extent has the automotive manufacturing company in Durban adopted TQM principles?
- Does the company view these six principles, hence TQM as a means to improve their business?
- Are the six principles of TQM being applied consistently between shifts, departments and the two plants?

The analysis and findings from chapter four in conjunction with the literature reviewed in chapter two will be used to answer these research questions.

5.3.1 Extent of TQM implementation

- Most Respondents did not agree that Senior Management viewed quality as more important than meeting production schedules. This was seen by the large mean variance (1.11) between what respondents deemed as the current (practice) condition and the ideal condition (importance).

- Respondents expressed the need for employees to be involved in decision-making and to be given the opportunity to take action themselves. The variance between the current practice and the perceived importance of this concern stood at 0.91.
- The company's customer focus strategies were found to be satisfactory. The average variance between practice and importance stood at a minimum of 0.60 as compared to other TQM elements.

- Respondents expressed dissatisfaction with the company's appraisal system and the basis upon which employees were promoted. The mean variance between current practice and its perceived importance for both stood at 1.33 and 1.15 respectively.

- Respondents were generally content with the way their process was managed. Although they continued to voice the need for more to be done in order to obtain ideal conditions. Respondents felt a strong need for equipment to be maintained according to plan. This was seen by the lowest mean attributed to the current practice (3.25) as opposed to the importance (4.38) they attributed to this service. Respondents also expressed the need to improve workplace tidiness at all times. Respondents were not satisfied with the inspection standards of supplier material. This was seen by the variance between the current practice (3.49) and the expressed importance (4.43) associated with this practice.
- Respondents raised concerns about the lack of cost implications of defects created by internal processes. The variance of means (1.22) between the current practice and the importance attributed to this was significantly high.

5.3.1.1 Correlation and Hypothesis Testing

- From the correlation test between the six TQM variables, it was found that there was significant multi-correlation. All correlations are above 0.5 and they range from 0.525 to 0.722. The strongest correlation between variables was (r=0.722) EI and E&M (**Hypothesis 2**). This signifies the important role played by empowerment & motivation in employee involvement. It was found that there is a positive relationship (sixth strongest correlation) between TMC and EI (r=0.675; **Hypothesis 1**). **Hypothesis 3** was also proved to be positive and true. It was found that EI had a positive relationship (seventh strongest correlation) with PM (r=0.644). Although it was not hypothesised, the study revealed a second strong correlation between PM and CI (r=0.706). This provided a rationale that continuous improvement activities strengthen process management.

- Since IE was the variable that was present in all three hypotheses, it also became the variable of concern. Four variables of TQM were analysed for their contribution in the variance of IE. Since respondents showed absolute satisfaction with CF strategies from their responses, it was omitted in regression analysis

5.3.1.2 Regression analysis

- A strong relationship between TMC, CI, E&M, PM and EI was established. 62% of EI variance was explained by these four predictors. TMC and E&M showed a unique contribution to EI, with TMC contributing the most. Hence employee involvement in this automotive company is predicted by the level of employees' motivation and the commitment of top management to their cause.
- Since a strong correlation was established between PM and CI a regression was computed to ascertain the factors that influenced PM the most from the 5 TQM elements. The model explained that 63% of the variance of PM is contributed by these 5 elements. The best predictor of PM was indeed verified to be CI out of all the elements. This verifies the fact that employees who continuously seek to improve their process also strengthens their management capabilities in the same process.
- Regression analysis did not find a unique contribution by EI on PM, even though there was correlation between the two. It can thus be concluded that in this study a positive correlation was found between the two, but EI does not contribute significantly to the variance of PM.

5.3.2 The company's stance on TQM as a means of improving the business

Section B of the research instrument began by assessing the respondent's knowledge about TQM. The following were the conclusions drawn from their responses.

- 69% of the respondents declared that they knew what TQM was about. Using a chi-square test for independence between these respondent's demographics and TQM awareness, it was found that the level of education and position held by respondents related to TQM knowledge. A simple

declaration of yes or no was not enough to conclude that respondents had sufficient knowledge of TQM principles.

- A second question was asked to inquire into what respondents knew about TQM so as to check the accuracy of their knowledge. The responses ranged from: insufficient knowledge (1); average knowledge (2), and Good knowledge (3). In this case, only 8% of respondents provided a correct definition of TQM. There were 27% who provided an average explanation, 22% of the answers were inaccurate and 44% answers were missing. Again from these responses a chi-square test was performed to test for independence between educational level, current position and TQM knowledge. In this instance there was no relationship established between these. This implied that even though TQM principles are established, the general management of the company were not aware of these principles as an imperative force to achieve excellence.

5.3.3 TQM application between shifts, plants and departments

- The ANOVA analysis established a statistical difference (p= 0.011) between TMC and two shifts, namely the white shift and the straight shift. The White shift held a better perception of TMC than employees from the straight shift. This was assumed to be attributable to the type of product these two shifts were producing. Since these two shifts focus on two different products with different sets of demands, top management may also vary their commitment accordingly. There were no significant differences found between the rest of the TQM elements' application on shifts.

- Significance was also found (p= 0.002) between TMC and two departments, namely Production and Quality. The production department had a better perception of TMC than quality. As expressed before in the analysis, the general management population viewed Top management as more committed to meeting production schedules then quality. This notion is again verified in the ANOVA test. There were no other significant differences found between the rest of the TQM elements

- A t-test found no significant difference in the application of TQM principle between the two plants, namely Weld and Press.

5.4 Summary

In this chapter the research questions derived from chapter one were overviewed and answered. The extent of TQM implementation the company was established discussed and it was noted that the TQM elements mean results could be compared to other studies done internationally such as Abusa (2011). Statistical analysis tools such as regression and correlation testing were used to further reinforce the findings obtained from the respondents. The company's commitment to TQM principles as well as its application was also established and discussed. The next chapter will focus on the conclusion and recommendations of the study.

Chapter 6: Recommendations and Conclusion

6.1 Introduction

This chapter will elaborate on the conclusions drawn in the previous chapter and integrate these with insights derived from the literature review presented in chapter two. There were considerable implications that were established by the study which could be used for the development of a framework to assist TQM implementation in South African automotive companies. The study outcomes represent significant contribution to the general knowledge of TQM. There were certain limitations to the study which will be presented, as well as recommendations for future research that were highlighted by research respondents and through data analysis.

6.2 Implications of the research

In this study a comprehensive list of TQM practices were articulated to investigate the extent of their implementation in the automotive company based in Durban. The present study's main focus was to use TQM literature to establish the inputs that result in optimum quality and productivity performance in a manufacturing system. The degree of implementation of these inputs was then tested in the two manufacturing plants of an automotive company based in Durban. The study contributes to the growing body of information on TQM implementation and it also attempts to highlight TQM elements that are relevant in the South African manufacturing context. The relationship between current TQM practice and its perceived importance on quality performance was investigated. The study contributed to literature by allowing respondents, by means of the survey, to voice their opinions on elements that required immediate attention and focus. The study also revealed areas of TQM where its principles were firmly entrenched. A framework for assessing TQM awareness within the shop-floor management was also developed in the study. This framework provided the motivation for TQM training to be considered for shop floor management to enable them to have adequate tools to deal with challenges of improving overall productivity.

The study also provides helpful implications and recommendations for the company to improve their TQM implementation and hence improve their performance. The implications revealed in this study may also be applied to other manufacturing

businesses in South Africa in an attempt to motivate companies to adopt TQM practices. This can in turn boost the overall performance of the manufacturing sector and hence the South African economy.

6.3 Review and Recommendations

The empirical evidence, in this study illustrated the extent of implementation of TQM principles in the Durban-based automotive manufacturing company. The results showed that Senior Management was committed to meeting production schedules rather than to achieving quality objectives. This was first evident in the large variance between the practice in the company and what respondents deemed as the ideal condition or importance. The ANOVA test also found significance between TMC and two departments, namely Production and Quality. It was revealed that production department had a better perception of TMC than the quality department. This implies that the current practice by top management was favourably skewed towards meeting productivity scores rather than to the achievement of quality outputs.

The general shop floor management expressed the need for employees to be more frequently involved in decision-making and to be given the opportunity to carryout corrective action themselves instead of this being a privilege of those in possession of command over company resources. This empowerment and motivation concern was strongly correlated with employee involvement (hypothesis 2), and was also found (together with TMC) to make the most contribution towards the involvement of employees. It was therefore concluded that employee involvement in the automotive company was predicated on the level of their motivation and the commitment of top management to their cause. The lack of employee participation and the lack of a transparent appraisal system alluded to by shop floor management, provided futile ground for employees to express discontent and a lack of commitment to the success of their plants.

‘’Continuous improvement activities strengthen process management’’. Even though this statement was not hypothesised, the correlation test found that a strong link existed between the two. Out of the five TQM elements, regression analysis also proved that continuous improvement of the process played a major positive role in the management of the same process. The company management must take into consideration that all information that is necessary to trigger interest into employees

must be provided and updated at all times. This includes cost implication of defective materials as was expressed by respondents in the survey.

From assessing the knowledge of TQM and its principles, it was apparent that even though some TQM principles were firmly entrenched, the general shop floor management were not aware of these principles as individually constituting a right to be driven for implementation if the company were to extract maximum quality and productivity benefits. It is recommended that training of TQM principles should take place at management level to equip them of the strategies necessary for achieving performance improvement.

6.4 Limitations of the study

There were limitations in the research methods employed in this survey. There was only one participating company in the survey. Although this company plays a leading role in the automotive industry in terms of sales and in the economy in general, a wider research is required on TQM implementation, inclusive of service companies as well as other manufacturing subsectors such as plastic, chemicals, textiles, metals and furniture.

This study did not consider testing the effect of TQM on overall performance of the company. Extensive literature review revealed that companies that adopted TQM principles performed better than companies that did not. The survey remained focused on testing the extent of TQM implementation and did not test the results thereafter. Many TQM researchers including Abuza (2011) and Oluwatoyin & Oluseun (2008) have assessed TQM implementation and its impact on operational performance in various sectors of manufacturing and services companies. In their surveys the impact of TQM on performance was related. Further research to link up TQM and performance would be required in the South African context. There were no senior managers who participated in the research. Their opinion would have shed light on their understanding of TQM and its importance as a means of improving business performance.

This survey provided a snap shot analysis, as the data was collected during a single point in time, a period in October 2013. A longitudinal study may be considered to address this issue as the findings must be considered with caution in drawing any definite conclusions about changes over time. Many surveys conducted on TQM

vary slightly with the principles associated with it. The study considered six principles that are generally associated with TQM and eliminated those that were deemed less related to the context and purpose. Some included ‘Supplier Management’ or ‘people management’. It is imperative that researchers align their studies to the principles that are more relevant to their survey.

6.5 Future Research

The current study was conducted in one company and one manufacturing sector, which is automotive. It is recommended that the study be extended to different companies of different industry types. This would reveal the stages of development and application of TQM principles in the unique context of South African companies.

It is also recommended that operational performance become part of assessing the effectiveness of TQM for each company. This will add to literature the prevalent perception of TQM as a system that enhances business operations and may highlight unique areas of improvement in the context of South African companies as already witnessed in this survey.

6.6 Summary

At the beginning of the study reference was made to the need for South African automotive companies to adapt to global standards of management practice in order to improve their quality standards and operational performance. South Africa’s vehicle export growth and its presence within the global value chain has presented a challenge for local companies to conform to specific performance standards.

As per the problem statement, the extent to which the automotive manufacturing company based in Durban has adopted TQM principles was fully investigated and the findings clearly outlined the status of the implementation. The survey outlined the general perception of TQM and its implementation status within the two plants and recommendations were made on how the company can improve the current condition and hence operational performance. The major limitation is that the survey was carried out on only a single company, meaning that outcomes of the research could not be generalised to the rest of the automotive sector.

It was recommended that the survey be extended to other automotive companies and to the general manufacturing sector in order to develop a contextual and standardised approach to the analysis of TQM implementation in South Africa.

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Appendix I: Informed Consent Letter

UNIVERSITY OF KWAZULU-NATAL
GRADUATE SCHOOL OF BUSINESS AND LEADERSHIP

Dear Respondent,

MBA Research Project
Researcher: Edoardo Cabral Ngubane (0727902120)
Supervisor: Christopher Chikandiwa (031 2608882)
Research Office: Ms P Ximba 031-2603587

I, Edoardo Cabral Ngubane an MBA student, at the Graduate School of Business and Leadership, of the University of KwaZulu Natal. You are invited to participate in a research project entitled Total Quality Management in automotive manufacturing. The aim of this study is to explore the extent to which the automotive manufacturing company based in Durban has adopted Total Quality Management principles and its view on the system as a means to improve their overall business.

Through your participation I hope to understand the company's leadership perception of the extent to which TQM principles have been adopted and to gain overall view on the company's stance of the system as a means of improving business. The results of the survey are intended to contribute to the Durban organizations to understand the factors that influence quality management and business performance in manufacturing industries.

Your participation in this project is voluntary. You may refuse to participate or withdraw from the project at any time with no negative consequence. There will be no monetary gain from participating in this survey/focus group. Confidentiality and anonymity of records identifying you as a participant will be maintained by the Graduate School of Business and Leadership, UKZN.

If you have any questions or concerns about completing the questionnaire or about participating in this study, you may contact me or my supervisor at the numbers listed above. The survey should take you about 10-20 minutes to complete. I hope you will take the time to complete this survey.

Sincerely

Investigator's signature_____Date_____

Appendix II: Questionnaire

Section A: Biographical information

PLEASE INDICATE YOUR RESPONSE BY CROSSING **X** **THE APPROPRIATE NUMBER.**

1. Gender

Male	1
Female	2

2. Age

<20 Years	1	31– 35	4
20 - 24 years	2	36– 40	5
25 - 30 years	3	40+	6

3. Work experience

Less than 1 yr	1	11-15 yrs	4
1- 5 yrs	2	16-20 yrs	5
6-10yrs	3	Over 20yrs	6

5. Level of Education

Matric, Std 10	1	Diploma	4
Post Matric Certificate (e.g. N - Courses)	2	Degree	5
Trade Test	3	Other(specify) ----------	6

6. Plant

Press	1	Assembly	4
Weld	2	Chassis	5
Paint	3	Stamping (TDM)	6

7. Section/ Department

Production	1	Maintenance	4
Quality	2	Engineering	5
Logistics	3		

8. Shift

White	1
Yellow	2

Not applicable	3

9. Current position

Team Leader	1
Group Leader	2
Technical Specialist	3
Engineer	4

Manager	5
Senior manager	6
Other(specify) _____	7

Section B. Implementing Total Quality Management (TQM)

B.1. Knowledge of TQM

1- Have you heard about the Total Quality Management before?

☐ Yes ☐ No

2- If yes, what do you know about Total Quality Management?

_____

_____

_____

3- From your perception, has your company implemented the TQM?

☐ Yes ☐ Planned ☐ Discontinued ☐ No ☐ Don't Know

B.2. For the following statements please indicate by crossing **X** **ONE NUMBER** which best describes your option according to the following codes:

Practice: 1 = strongly disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly Agree

Importance (level of perceived importance of the factor for the company): 1 = Very low; 2 = Low; 3 = Moderate; 4 = High; 5 = Very High

Top Management Commitment

On a scale of 1 – 5 how will you rate top management commitment of your organisation and how is your perceived importance for each factor.

	Statement	Practices					Importance				
1	Senior management are actively involved in establishing and communicating the organization's quality goals, plans and visions.	1	2	3	4	5	1	2	3	4	5
2	Senior management anticipate work process changes and make plans to accommodate it.	1	2	3	4	5	1	2	3	4	5
3	Senior management allocate adequate resources towards employee education and training in efforts to improve quality.	1	2	3	4	5	1	2	3	4	5
4	Senior management view quality as being more important than meeting production schedules	1	2	3	4	5	1	2	3	4	5
5	All departments Heads (Production, Quality, Maintenance, Logistics) within our company accept their responsibility for quality.	1	2	3	4	5	1	2	3	4	5
6	Top management strongly empowers and encourages employee involvement in quality management activities	1	2	3	4	5	1	2	3	4	5

Employee involvement

On a scale of 1 – 5 how will you rate the top employee involvement of the organization and the perceive importance.

	Statement	Practices					Importance				
1	Management encourages and recognize team-work effort and team-approach to solve problems	1	2	3	4	5	1	2	3	4	5
2	Employees are involved in decision making and are made responsible for taking action to fix problems they find.	1	2	3	4	5	1	2	3	4	5
3	Employees are actively involved in quality related activities such as QC circles	1	2	3	4	5	1	2	3	4	5
4	Employee suggestions are implemented after an evaluation.	1	2	3	4	5	1	2	3	4	5
5	Employees are very committed to the success of our plant.	1	2	3	4	5	1	2	3	4	5
6	Reporting work problems is encouraged in our firm.	1	2	3	4	5	1	2	3	4	5

Customer Focus

On a scale of 1 – 5 rate customer orientation and its importance for the company.

	Statement	Practices					Importance				
1	Our service/product are based on meeting the needs of the customer	1	2	3	4	5	1	2	3	4	5
2	Customer relationship and partnership are regarded as important in our organisation	1	2	3	4	5	1	2	3	4	5
3	Our plant responds quickly to customer complains	1	2	3	4	5	1	2	3	4	5
4	Communication and training processes emphasize on customer focus	1	2	3	4	5	1	2	3	4	5
5	We record and review customer complains on a regular basis	1	2	3	4	5	1	2	3	4	5
6	Customer focused strategies and approaches are continuously reviewed for further improvement.	1	2	3	4	5	1	2	3	4	5

Empowerment and motivation

On a scale of 1-5 how will you rate empowerment and motivation and its perceived importance with the listed variables

	Statement	Practices					Importance				
1	We have a transparent and effective appraisal system for recognizing and rewarding employees for their efforts in improving quality	1	2	3	4	5	1	2	3	4	5
2	Employees are encouraged to accept education and training in our organization	1	2	3	4	5	1	2	3	4	5
3	Employees are trained to perform more than one job to expand their skill levels	1	2	3	4	5	1	2	3	4	5
4	Excellent suggestions are financially awarded	1	2	3	4	5	1	2	3	4	5
5	Positions promotions are based on work quality in our plant	1	2	3	4	5	1	2	3	4	5
6	Employees are regarded as valuable, long term resources worthy of receiving education and training throughout their career	1	2	3	4	5	1	2	3	4	5

Process Management

On a scale of 1 – 5 how will you rate process management of your organization as well as the perceived importance of these factors?

	Statement	Practices					Importance				
1	Our work process is kept neat and clean at all times	1	2	3	4	5	1	2	3	4	5
2	We keep updated records of all quality related issues in our plant	1	2	3	4	5	1	2	3	4	5
3	Work equipment is well maintained according to plan in our plant	1	2	3	4	5	1	2	3	4	5
4	Inspection standards are applied effectively in our plant to allow detection of potential defective material/equipment.	1	2	3	4	5	1	2	3	4	5
5	Monitoring and inspection is done according to documented procedures.	1	2	3	4	5	1	2	3	4	5
6	We have a standard procedure to ensure that defective materials are not used in any process of production in our plant	1	2	3	4	5	1	2	3	4	5

Continuous Improvement

On a scale of 1 – 5 how will you rate continuous improvement of your organization

	Statement	Practices					Importance				
1	Our organization encourages continual changes and try-outs to improve processes and product quality	1	2	3	4	5	1	2	3	4	5
2	We frequently measure the product quality that is received by our plant and the product quality sent to our customers	1	2	3	4	5	1	2	3	4	5
3	Cost implications of defective products created by our internal processes are continuously updated and displayed for everyone to see	1	2	3	4	5	1	2	3	4	5
4	Our decisions regarding quality improvement is always based on objective data.	1	2	3	4	5	1	2	3	4	5

Thank you for your participation

Appendix III: Ethical Clearance Certificate