GRADUATE SCHOOL OF MANAGEMENT

MASTER OF BUSINESS ADMINISTRATION DEGREE

“AN INVESTIGATION INTO THE SOURCE OF QUALITY FAILURE IN THE BEVERAGES INDUSTRY. A CASE OF DELTA CORPORATION”

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A dissertation submitted to the Graduate School of Management in partial fulfilment of the requirements for the award of the Master of Business Administration Degree.

SUPERVISOR: MR E. MAKONI

February 2015
DECLARATION

I, Danmore Kokera, do hereby declare that this dissertation is a result of my own investigation and research, except to the extent indicated in the acknowledgements, references and comments included in the body of the report, and that it has not been submitted in part or in full for any other degree to any other university or college.

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        Supervisor Signature                     Name                               Date
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Abstract
This study was an investigation into the sources of quality failure in the Beverages industry, a case of Delta Beverages. This research was important to Delta Beverages as it was establishing the source of quality defects for Delta Beverages in the form of consumer complaints and product defects. This meant taking a more proactive role with regards to quality and ensuring that quality assurance was implemented to control losses due to non-quality. The objectives of the study were to establish whether materials used in Beverage manufacture is the source of quality defects. Investigate if machinery and maintenance is the source of quality defects for the beverages industry, establish the relationship between personnel, management and quality defects production, and establish the relationship between Quality systems, methods and quality defects.

Methodology used in the study was quantitative approach that emphasises testing theories or concepts through variable metric measurement and performing data analysis procedure with statistical tools and aim to test the hypothesis. Structured questionnaires were used for the data collection where sampling technique used was stratum, in which respondents came from different departments of Delta Beverages. There was an 89% overall response rate Research results were presented, analysed, interpreted and discussed, data was presented using table, cross tabulations, bar graphs.

Data analysis was done using SPSS Statistical processing for social science software. The research’s response rate was high and therefore the sample was a representative. My research showed that the Cronbach’s alpha for all the objectives Machinery, material, methods and manpower in relation to quality failure in the research study were ranging between 0.7 to 0.9 showing a strong relationship between the 6Ms and quality failure. Chi-Square and Cramer’s V Tests showed a strong relationship for production, engineering with regards to frequency of quality failure while a weak relationship for sales and procurement.

Conclusions of the study was that the 6M thus material, machinery, man power and methods are indeed the source of quality failure Recommendations on material quality processing were that the quality and procurement department should carry out unannounced supplier quality surveillance audit. Machine recommendation was that the Engineering department must carry out effective maintenance scheduling and adherence tracking. Quality methods
recommendations were alignment of sales department, engineering, packaging and procurements focus on customer feedback, benchmarking with the best in class quality control at source implementation and evaluation in each department.
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CHAPTER 1

1.1 Background of the study on sources of Quality failure in the Beverages industry

In the beverages business for one to achieve and maintain market share product quality is of paramount importance. Identifying these key sources of quality failure will result in market share securing and increased profitability of the business. Within Delta Beverages business quality failure comes in many forms ranging from raw materials, in process product both intermediate and finished product, consumer complaints from the market and trade complaints (market returns). Even though quality control and Standard Operating Procedures are in place to ensure product meets quality set parameters, this has not eliminated product quality failure in the business thus costing the business millions of dollars.

Delta has Franchise partners in the form of Coca Cola Company and SABMiller that enforce some Quality management systems namely ISO 9001 and FSSC 22000. There are Coca Cola operating requirements that are Coke based Quality systems. These have certain product specifications that are required to be adhered to, failure to meet those parameters mean poor quality product that will be destroyed resulting in a loss to the business. Huge volumes of product are expiring in the market and warehouses due to poor Total Product Management practices.

In Chibuku, a Sorghum beer division of Delta Beverages, there has been a sharp increase in demand of the new Chibuku Super brand by consumers while the Chibuku old formulation has been going down. Chibuku is a sensitive product with a very short shelf life thus poor product handling and storage practices means product losses to the business.

Looking at Delta Beverages a beverages manufacturing concern has massive high tech equipment, wide variety of materials that go into its products both imported and local supplied, massive competent human capital that spans across all sectors of engineering, quality finance to name just a few. Different methods and Standard Operating Procedures are used to manufacture products to achieve the desired quality specification. A consistent method of measurement is key to achieve quality, equipment calibration and use of modern equipment has seen improvements in production of defect free products. The Mother Nature also plays a key contribution to the quality of Delta products. Management commitment as stated in the Quality policy is critical to the production of quality products and elimination of quality defects through the provision of resources.
These 6Ms of production are the critical arms of any process to achieve a good quality product. In the case of Delta there has been massive cost incurred due to poor quality as a result of the 6Ms of production. Data below entails the number of consumer complaints that have been received by each business unit. These complaints by customers have seen some consumers claim damages, litigation and damage to the brands of Delta beverages and its partners.

Delta Corporation is a broad-based company with vast interests in beverages (manufacturing and distribution) and the Agro Industrial sectors. It is listed on the Zimbabwe Stock Exchange and is among the top companies in terms of market capitalisation. Its beverage business manufactures and distributes Lager beer, Traditional Sorghum beer Sparkling Soft Drinks and recently introduced a non-carbonated and dairy product line. In the Agro Industrial sector the company is involved in Barley and Sorghum malting.

The company was established in 1898 when the foundation stone was laid by the Salisbury Lager Beer Brewery and Ice Factory. It was first listed on the Stock Exchange in 1946 as Rhodesian Breweries Limited and later changed its name to Delta Corporation in 1978. In Zimbabwe currently Delta Corporation is like a monopoly with very little competition in the Beverages Industry. Due to the freeing of inter-regional markets this has seen cheaper product imports in the form of cans and PET Coke products being imported and selling at a lower price compared to Delta products. Thus reduced market share and volume decrease for Delta products.

![Total number of Bottles Affected by Reason (YTD) (Apr 2013- Mar 2014)](chart.png)
The information reported in relation to possible quality defects should be recorded, including all the original details. The validity and extent of all reported quality defects should be
documented and assessed in accordance with quality risk management principles in order to support decisions regarding the degree of investigation and action taken. If a quality defect is discovered or suspected in a batch, consideration should be given to checking other batches and in some cases other products, in order to determine whether they are also affected. In particular, other batches which may contain portions of the defective batch or defective components should be investigated.

1.2 Problem statement
Quality defect investigations include a review of previous quality defect reports or any other relevant information for any indication of specific or recurring problems requiring attention and possibly further regulatory action. In order to protect public health and brand market share, a system and appropriate procedures should be in place to record, investigate and review complaints including potential quality defects, and if necessary, to effectively and promptly recall products from the distribution network. Quality Risk Management principles should be applied to the investigation and assessment of quality defects and to the decision-making process in relation to product recalls and other risk-reducing actions.

With the recent liquidity crisis in Zimbabwe, product quality has become the major competitive advantage for most companies in the manufacturing sector especially the beverages manufacturers. Product defects due to non-quality at point of production, shipment and point of sale will determine the profitability of a company. The high cost of manufacture has been the main reason for losses, compounded by poor quality products that are not competitive regionally and internationally both on price and product quality. What does this mean or call for? This calls for production of goods that are of superior quality at a low cost.

Most consumers in Zimbabwe have become more quality conscious and price sensitive due to the liquidity crunch. There has been an upsurge in litigation and media attack on poor quality products, with competitors taking advantage of the reported consumer complaints. Many companies have closed shop, employees losing their jobs as a result of poor product quality.

Losses due to poor quality or first time quality defects have become a major focus area for many companies internationally as there are costly to the organisations. Elimination of such waste has become key. Thus first time quality is now the way to go. Good quality volume growth will definitely improve the bottom line thus growth of profitability year on
Quality defect investigations included a review of previous quality defect reports or any other relevant information for any indication of specific or recurring problems requiring attention and possibly further regulatory action. To this end, the current study seeks to make an investigation into the sources of quality failure in the Beverages industry using Delta Corporation as a case study.

### 1.3 Research Objectives

The main purpose of undertaking this study is to investigate the source of quality defects in the Beverages industry. This study will particularly seek to:

1. To establish whether materials used in Beverage manufacture is the source of quality defects
2. To investigate if machinery and maintenance is the source of quality defects for the beverages industry
3. To establish the relationship between personnel, management and quality defects production
4. To establish the relationship between Quality systems, methods and quality defects.

For the purpose of investigating the sources of poor quality, it is important to seek answers to the following research questions:

1. How is machinery the source of quality defects for the beverages industry?
2. How is material quality a source of quality defects in beverages manufacture?
3. What is the relationship between Quality systems, methods and quality defects?
4. What is the relationship between personnel competences and quality defects?
5. Is there a relationship between engineering maintenance practices and product quality defects?
6. What recommendations can be proposed based on the results of the study?

### 1.5 Research Hypothesis

The following is the hypothesis the study seek to test:

Ho: The 6Ms are not the source of quality defects in Delta beverages products

H1: The 6Ms are the source of quality defects in Delta Beverages products
1.6 Justification of the research

This research is important to Delta Beverages as it will establish the source of quality defects for Delta Beverages. This will mean taking a more proactive role with regards to Quality and ensuring that quality assurance is implemented to control losses due to non-quality. Meeting and surpassing customer expectations on quality entails growth of new brands and products hence increase sales volume and profitability.

It is important to emphasise the need for the causes of quality defects/complaints to be investigated and determined, and that appropriate preventative actions are put in place to guard against a recurrence of the issue. Clarifying expectations and responsibilities in relation to the reporting of quality defects to the Supervisory Authority is of great importance.

Effective quality management will enable Delta Beverages to identify its strengths, opportunities, weaknesses and threats then plan accordingly to ensure that quality objectives are achieved to defend and grow its market share. Quality assurance will be a key to unlocking potential in profitability growth on long established brands and infant brands. The reduced cost of manufacturing due to first time quality assurance will mean reduced price of products, higher profit margins and high sales volumes thus ultimately improving profitability. This will definitely mean shareholder value preservation and perpetual growth of the business. With the high investments in plant and equipment that Delta has done in the past four years, it is important for Delta to report considerably high profits year on year. This study will facilitate reaching out for the benefits through ascertaining sources of poor quality which may need plugging.
1.7 Scope of the Research

1.7.1 Research period
The period of research spans from 2013 to 2014. The researcher will be able to make meaningful comparisons as it is the recapitalisation era. Furthermore, the time period is long enough to draw valid and reliable conclusions.

1.7.2 Respondents and coverage
The research is restricted to the management and employees of Delta Corporation. The reason on the selection of the respondents is mainly on their exposure and understanding on the quality’s impact on profitability. Furthermore, the research will focus on Delta Beverages headquarters in Harare due to time and resource limitation. Further to this Delta operations are almost similar to each other thus focusing on the Harare operation will give a true representation of the research.
Chapter 2

2. Literature review

2.1 Introduction

The definition of Quality has had no consensus; quality has been defined in many different ways by different authors. Total quality management gurus like Garvin, Juran, Crosby, Deming, Ishikawa and Fegenbaum defined quality and total quality management in differing ways. According to Garvin (1987), the definition of quality was that it is transcendent, product based, user based, manufacturing based and value based. Garvin also identified eight attributes to measure product quality. Then Juran (1984) defined quality as fitness for use, Jurans’ focus was on trilogy quality planning, quality control and quality improvement. According to Crosby 1974 quality was defined as conformance to requirements or specifications. Crosby then went further to identify 14 steps for zero defect quality improvement plans to achieve performance improvement (Kruger, 2001).

According to Deming quality is a predictable degree of uniformity and dependability at low cost and suited to the market. He also identified 14 principles of quality management to improve productivity and performance. Ishikawa emphasised the importance of total quality control to improve organisation performance, his major contribution was in the area of using a cause and effect diagram (Ishikawa diagram) in diagnosing quality issues (Kruger, 2001).

According to Heizer and Render (2009), quality has become so important that the world is uniting around a single quality standard that is ISO 9001, which is the internationally recognised Quality Monitoring Scheme standard and globally it’s the most applied standard. Poksinska et al (2002), defined ISO 9001 as a family of standards which relate to QMS and are designed to assist organisations in meeting their customers’ and stakeholder’ needs. All this boil down to profitability of an organisation as there is total uptake of the products in the market and zero loss due to non-quality.

2.2 Local Case study on ISO 9001 implementation

According to a local case study done by Chikuku et al. (2012), ISO 9001 which is a quality management system has a positive effect and increases competitiveness in capacity utilisation. Chikukus’ case study also stated that ISO 9001 increases new product development, employee pride and motivation. Chikuku et al. case study also noted that overall equipment effectiveness, provision of adequate tools to employees and revenue per employee
improves with implementation of ISO 9001 quality management system. Chikuku. et al recommended full management commitment beyond ISO 9001 certification day, continual staff training and involvement of all staff and continually seeks pre and post audit advice from certifying body.

2.3 Local case study on Total quality management

According to a study done by Chipandambira et al. 2012 on an investigation of the performance indices in the food industry in Zimbabwe quality management is becoming increasingly important to the leadership and management of all companies for competitive advantage, thus it is important to view Total quality management as a distinct management philosophy that advocates for excellent management of every department of the company. According to Chipandambira et al, total quality performance indices are measured by TQM success factors and the TQM key performance indicators.

Chipandambira et al. classified the performance indices into primary and secondary key performance indicators in which primary success factors were broad and include secondary success factors. Human resource management was classified as a primary performance indicator comprised of employee empowerment and involvement, training and education, safety and health, employee satisfaction, motivation and human resource planning. Process management (Primary Success factor) also include production and inventory management, maintenance, quality control, quality assurance and environmental and safety management.

However Chipandambira et al. noted that for an effective and successful Total quality management program, the secondary success factors should be the focus. Chipandambira etal .research focused on eighteen Total quality management performance indices. According to the quantitative analysis of the performance indicators done by Chitambira, a hierarchy of the performance of the success factors was developed. These Hierarchy of Total quality management performance indices were ranked as follows

The results of the study by Chipandambira et al. 2012 showed that the Zimbabwe food manufacturing and processing industry during the period (2010-2011) was mainly focused on the customer. As shown by the hierarchy concepts of customer focus, quality assurance, benchmarking and process quality control are highly ranking. Their study showed that the concepts which focus on the employee were side-lined as shown by the hierarchy. Employee satisfaction, human resource planning, empowerment and involvement are low ranking. 

Recommendations from Chipandambira et al study were that Organizations should aim for ISO certification i.e. ISO 9000 and ISO 31000 for quality management systems and risk management respectively. The second recommendation was on benchmarking activities for all aspects of the company which are product, processes, financial, energy, operation, strategic and functional benchmarking, the other recommendations were on training, own training programs. The last recommendation from Chipandambira et al was on investment in technological improvement on the management systems and for maintenance and process management. On employees Chipandambira et al recommended more involved in decision making at departmental level, management delegation of responsibilities to other junior staff. Lastly recognize and reward diligent, committed and loyal employees

2.4 Model 1Fishbone – The Cause and Effect Diagram

According to (Ishikawa 1980) the Fishbone – Cause and Effect Diagram is a visual of the critical elements that may contribute to the problem, or effect, the building/district was based on experiencing. The fishbone diagram is used to identify the effect, or specific problem, and then the possible causes of that effect. The visual allows you to organize a lot of information and zero in on specific causes. It is extremely helpful in finding “root causes” to problems
The diagram is often used as a tool for solving problems with the cause factors being referred to as the 5Ms. Later, a sixth M was added using the French word ‘Milieu’ for Environment. These cause factors or variables are simply the vital few factors that influence the effect as in reality there could be an infinite number of such factors. The labels on the ends of the lines are the most common causes of the effect and are responses to the question “What makes this happen?” On the arrows feeding the cause are other causes in that group that arise from repeating the same question. Ishikawa astutely observes that the cause factors actually represent the process that creates the effect and therefore not unreasonably defines a process as ‘a collection of cause factors’.

According to Ishikawa the 6Ms used in the classic Cause and Effect Diagram are very useful in helping diagnose the cause of problems and can be used in product planning but the language is that of manufacturing. However, the visual effect of the diagram has great merit in showing the relationship between cause and effect and thus can be a powerful tool for identifying the factors that influence any results.

**2.4.22 Effects have causes**

According to Ishikawa the “Cause and Effect Diagram” was a tool for identifying the factors that need to be controlled to achieve quality characteristics. The diagram as depicted by Ishikawa.
2.5 Model 2 A different perspective ~ the 6Qs

According to Hoyle(2009) Ishikawa’s 5Ms and later 6Ms are indeed significant cause factors, but Hoyle (2009) presented a different perspective that used the word results instead of effects to change our perception of the tool and use it as a planning aid rather than a problem solving aid which was Ishikawa’s original intent. However Hoyle (2009) used the 6Qs instead of 6Ms, with the Q standing for ‘Question’ these questions have been adapted from those initially published by Hoyle et al.(2000)

2.5.1 The first Q ~What are we trying to do?

According to Hoyle 2009 the most important factor in achieving results is in knowing what you are trying to do. Hoyle stated that clearly if we don’t know what we are trying to do, any result will be acceptable. But even if we think we know what we are trying to do; there are several factors upon which effective objectives depend. Hoyle (2009) stated that our own objectives needed to align with those of the Department in which we work, and that Department’s objectives aligned with the organization’s objectives and the organization’s objectives aligned with those of society. Deming’s expressed alignment with the phrase “constancy of purpose. Hoyle (2009) noted that everyone might have aligned objectives but it’s important that those working together are united behind a common objective with a consistent interpretation so that are all driving the same directing expecting the same results from their efforts.

According to Hoyle 2009 objectives are no good without criteria for measuring when they are being achieved. However, the right measures have to be in place otherwise the achieved results as measured will not be consistent with the required results and they might encourage managers to cheat. Hoyle 2009 stated that we use measures for helping us look at the right things like response time, but needed targets to tell whether the achieved result is good or bad. Sometimes the targets are overoptimistic and unachievable and on other occasions they are expressed inadequately.

2.5.2 The second Q – How will we make it happen?

According to Hoyle 2009 an objective without activity accomplishes nothing, equally activities without an objective serves no purpose so the two go hand in hand and therefore answering our second question is vital for success. Hoyle then notes that making things happen depends on carrying out different types of activity each with a specific purpose. Hoyle 2009 identified
that fail to plan, plan to fail, therefore without planning; the objectives are unlikely to be achieved except by chance.

2.5.3 **The third Q – What competences do we need?**

According to Hoyle all plans need to be resourced in order to be implemented and foremost among these resources are the people who will manage and perform the activities specified. Hoyle 2009 stated that results depend not only on having sufficient numbers of people but also on the competences of these people, for if they are not equipped with the right competences, throwing more people at a problem will not solve it. Hoyle 2009 noted several factors upon which provision of effective human resources depends. Hoyle 2009 noted that people not only need the right knowledge but the ability to apply it when circumstances demand.

Hoyle noted the factors that affected the provision of human resources. Training is intended to deliver skills but often it only delivers an experience. As with knowledge, acquired skills are of no use if the incumbent cannot use them to deliver the right results.

A person’s behaviour, regardless of skill and knowledge, under operating conditions is often crucial to the results achieved. For example, an arrogant and aggressive person is unlikely to win friends and influence people even though he might have a college degree and have been trained.

There are some core values the organization stands for that translate into beliefs and produce acceptable behaviours. These values might be thought of as its moral compass. Displaying the wrong set of values entails that the written policies and exhortations will create the wrong environment for making workers productive. Harnessing the best people will not lead to success unless they are protected from the hazards of the workplace. (Hoyle 2009 p.4)

2.5.4 **The fourth Q – What capability do we need?**

Hoyle 2009 stated that in addition to competent people, organizations needed a range of physical resources to equip them with the capability to deliver the required results. In which he noted there are several factors upon which provision of effective physical resources depends.

Hoyle 2009 identified that machines extended the capability of personnel who depend on them to achieve the results required. Neglecting the machines reduced an organisation’s capability and adversely affects results on quality.

Hoyle 2009 stated that some organization needed no more than an office; others need acres of buildings and process plant to achieve their quality objectives. Success depended on those
facilities at the customer interface being capable of delivering a desirable customer experience.

According to Hoyle 2009 the quality of the end product depended upon the quality of its constituent parts and materials. Hoyle 2009 noted that the integrity in the supply chain depended upon the parties involved honouring their commitment and having the capability to delivering quality product on time.

According to Hoyle 2009 having the right tools in the right condition at the right time for the right job was important for success. Hoyles’ focus was mainly on engineering maintenance practices thus making do with inadequate tools reduced ones capability and jeopardised success.

Hoyle 2009 stated that accuracy and precision in measurement was crucial for success because there was no advantage in shipping product that is nearly right, he stated that you needed to be as certain as you can be that it is right to achieve your quality objectives.

2.5.5 The fifth Q ~How are we going to fund it?

According to Hoyle 2009 financial resources are the lifeblood of an organization. H noted that without funds none of the plans made can be implemented. Money is needed to pay the salaries, buy the materials, and build the facilities to produce the outputs that will deliver the required results. Hoyle noted several factors upon which provision of effective financial resources depended upon.

Hoyle 2009 claimed that drawn up a plan for achieving an objective, one generally produces a budget that defined the financial resources required. Hoyle 2009 also noted that when bidding for work, budgets are often underestimated and when bidding for funds they are overestimated – that’s just human nature. However, when there are more pressing priorities budgets can be cut forcing planned activities to be curtailed putting the success of the project at risk.

Hoyle 2009 stated that the revenue that a project produced for the organization is crucial to its success. If the revenue falls below the level needed to cover costs, the success of the project is put in jeopardy and thus ways have to be found to achieve the required results at a lower cost.
2.5.6 The sixth Q ~ How will we know we are doing the right things right in the best way?

Hoyle 2009, argued without a compass, managers will only have their instinct and anecdote to tell them where they are going. He noted that it was very important for managers to undertake regular and systematic measurements and reviews of the processes employed to deliver the required results. Hoyle 2009 noted several factors upon which effective reviews depended.

Hoyle 2009 stated that doing things right is about performing as planned, meeting the objectives as measured and on target. He went further to say having reliable data on every critical aspect of performance was crucial to the success of any endeavour.

According to Hoyle 2009 doing things in the best way was about doing things efficiently, using the most appropriate machine, tool, technique, solution or approach to do a particular job and not wasting time and other resources unnecessarily. Hoyle stated that even if the objectives were being achieved there may be better ways of achieving them. That’s he concluded that success in the long term depended upon efficient ways of working.

Factors affecting the conduct of reviews
Hoyle 2009 affirmed that doing the right things was about doing things effectively, choosing the right objectives, the right measures, the right people, the right time, the right place, the right method.

2.2 Model 3 Crosby Quality Concept

Crosby 1996 argued that by avoiding the language of manufacturing and using the language of the boardroom, we can create a tool for focussing the attention of management onto the key questions that will reveal what is needed for success. According to Crosby 1996 the questions can be asked at any level in the organization and for any level, people need to know the answers as they relate to their job, whether it be cleaning the floor or managing the enterprise.

Crosby 1996 laid down quality concepts and principles, and defined quality as free, the integrity systems “table,” the five erroneous assumptions that management makes, and the essential traits of a quality manager. Crosby 1996 outlined the five stages and six measurement categories of the Quality Management Maturity Grid. And the fourteen steps of Crosby’s Quality Improvement Program.

Crosby argued that the cost of implementing a corporate quality program is offset by the cost savings of preventing defects. Crosby outlined the total cost of quality includes prevention, appraisal, and failure costs:
Crosby ascertained that prevention costs include the following activities: design reviews, product qualification, drawing checking, engineering quality orientation, quality improvement programs, supplier evaluations, supplier training, specification reviews, process capability studies, tool control, operating training, quality orientations, acceptance planning, quality audits, and preventive maintenance.

Crosby 1996 affirmed that appraisal costs include the following activities: prototype inspection and testing, production specification conformance analysis, supplier surveillance, receiving inspection and testing, product acceptance, process control acceptance, packaging inspection and status measurement and reporting.

Crosby 1996 further pointed that failure costs include the following activities: consumer affairs, redesign, engineering change orders, purchasing change orders, corrective action costs, rework, scrap, warranties, after-sales service, and product liability.

2.6.2 The Integrity Systems “Table”
According to Crosby the quality management requires a deliberate strategy to motivate people to adopt and sustain quality principles. Crosby further stated that a corporate quality program is a “table” supported by four “legs”: Crosby stated that there should be active involvement of top management in quality improvement. That sets a level of expectation for the rest of the organization. Crosby 1996 argued that a successful quality program depends on networking and training activities through quality councils, formal educational training, and professional certification within the organization. Quality programs should be based on practical activities that can be implemented at all levels in all of an organization’s units. Crosby outlines several quality programs including a fourteen-step improvement program, Zero Defects, and Buck a Day (BAD). More important than cash or financial awards, public recognition demonstrates the organization’s commitment to and value for quality.

2.6.3 The Five Erroneous Assumptions
Crosby 1996 confirmed that most managers hold five erroneous assumptions about quality and quality programs. Crosby reasoned that these assumptions were the source of most misunderstandings and disagreements between those who demand quality and those who are supposed to achieve it. Crosby maintained that the truth was as follows-- Quality is conformance to requirements. Crosby 1996 stated that requirements must be clearly stated so that they cannot be misunderstood. Thus Crosby arguing that the only performance standard is Zero Defects.
Quality can be measured by the cost of quality; Crosby 1996 claimed that the cost of quality is the expense of prevention, appraisal and failure recovery. Crosby maintained that measurements should be displayed as visible proof of improvement and recognition of achievement.

According to Crosby 1996 in any business, it is cheaper to do it right the first time. Crosby reasoned that there are many excuses for not adopting quality improvement programs. One is that the “economics of quality” won’t allow an organization to do something, or that “our business is different”. These are excuses that have no real meaning. Most quality problems originate with those who do the planning and creating—in accounting, engineering, information systems, or marketing—and not with manufacturing workers. Crosby 1996 argued that there is no such thing as a quality problem.”

Crosby affirmed that quality is shared by every function. According to Crosby 1996 errors, problems, and defects should be attributed to those who cause them, not the quality department.

2.6.4 **Model 4** Deming stated the Fourteen Steps to Quality Improvement that are like a cycle

Deming’s first step was management commitment with an emphasis on defect prevention and visibility. This was followed by Quality improvement teams composed on members of each department or function—all the necessary tools, the next step Deming noted was quality measurement to monitor the status and improvement of activities. Cost of quality evaluation by the comptroller for accurate figures followed. Deming then stated that quality awareness by communicating the cost of quality, encouraging discussion Corrective action to ingrain a habit of identifying problems and correcting them became the next step. Deming affirmed the next step to be an ad hoc committee to advocate “zero defects”.

Supervisor training so that all managers understand the programs and can explain it. Zero Defects Day to establish “zero defects” as the organizational standard. Goal setting as teams, specific and measurable. Removing the causes of defects, as described by individual workers, so that the people know their problems are heard and answered genuine recognition for achievement. Quality councils of quality professionals and team chairs for status information and ideas. Do it over again—repetition make the program perpetual.

2.7 **Model 5** The eight most popular critical factors of quality management
This section presents a discussion of the eight most popular critical factors of quality management developed and utilized by the seven groups of researchers.

2.7.1 Top Management Support
The first and strongest critical factor of all is top management support, a theme emphasized by Deming (Deming, 1986, as cited in Zeitz, Johannesson, & Ritchie, 1997) and repeated by many other researchers. Strong commitment from the top management was vital in quality management. Rao et al. (1999) described this critical factor as the top management’s commitment in providing active and timely support to build quality awareness, leading to higher quality performance.

Most of the other researchers consented to this notion (Saraph et al., 1989; Flynn et al., 1994; Ahire et al., 1996; Zeitz et al., 1997; Joseph et al., 1999). However, Black and Porter (1996) did not include this critical factor in their study. Instead, they introduced another critical factor, corporate quality culture, which is about encouragement of a company-wide culture committed to quality improvement. As top management support plays a significant role in encouraging company-wide culture that is committed to quality improvement, the critical factor ‘top management support’ is preferred by most researchers.

2.7.2 Quality Information Availability
Flynn et al 1994 stated that a proper flow of quality information directs an organization to improved performance. According to Hayes (1981), provision of timely and accurate information about the manufacturing process is important to control the process and reduce defective products. Immediate problem-solving keeps the process in control. Rao et al. 1999) affirmed that pertinent quality information from workers, suppliers and customers must be accessible to the top management as well as to employees to allow effectual decisions on quality matters. All the researchers mentioned, except for Ahire et al. (1996) and Zeitz et al. (1997), took into consideration quality information availability as one of the critical factors of quality management. Although quality information availability was not included as one of the critical factors of quality management in Ahire’s study (Ahire et al., 1996) quality information usage was considered as one of the critical factors of quality management. The study evaluated quality information usage based on 6 items, namely availability of the cost of quality data to manager, visual display of quality information, visual display of quality performance versus goals, transmittal of defects information to specific work stations availability of scrap data, and availability of rework data.
A careful analysis of these 6 items showed that they are more relevant in measuring quality information availability. Therefore Ahire’s study (Ahire et al., 1996) actually used quality information availability and not quality information ‘usage’.

2.7.3 Quality Information Usage
Rao et al. 1999 stated that quality information usage was an important feature of quality information management. Even though quality information is available, only the effective use of it leads to quality improvement. As pointed out by Rommel (1996), the capability to provide information to employees, where needed and when needed for timely reaction, was the foundation of excellent information management. Rao et al. (1999) suggested three items to measure quality information usage. They suggested that quality information usage be measured by looking at the extent to which quality data is used by top management in decision making, middle management in planning and controlling and hourly workers in their operations.

2.7.4 Employee Training
According to George and Jones 2005 employee training was found to be one of the critical factors in quality management. Training was affirmed to be an efficient way to increase workers’ ability to perform better than the lowest level required (George & Jones, 2005, p.60) while an organization which fully utilizes the skills of its workers’ ability is on its way to achieving organizational effectiveness. Rao et al 1999 stated that training employees in quality concepts and tools increased the effectiveness of quality improvement activities which required employee involvement. In other words, training contributes to successful implementation of quality management systems in a firm. As pointed out by Rao et al. (1999), training has become a prerequisite to achieving world-class manufacturing status.

2.7.5 Employee Involvement
Employee involvement was defined as ‘to empower employees, to provide them information, to upgrade their knowledge and to provide remuneration for quality performance’ (Oliver, 1988, as cited in Rao et al., 1999, p.5). Stoner, Freeman and Gilbert (1995, p.277) defined empowerment as ‘the act of providing authority, knowledge and resources to individuals so that they can achieve work objectives’ Among the 7 groups of researchers, only Ahire et al.,(1996) identified 2 different critical factors of quality management – employee involvement and employee empowerment. All the other researchers used only employee
involvement as a critical factor. Abiding by Oliver’s definition, all the researchers mentioned, except for Ahire et al. (1996), had considered empowerment as part of employee involvement.

2.7.6 Process/Product design
Rao et al 1999 stated that the aim of product design was to develop a product that meets the demands of the market with a competitive advantage. According to Rao et al. (1999), when a product is designed in such a way that it is unproblematic to manufacture, the manufacturing process variance is reduced. The researchers mentioned that the design of a production process is inter-related to the design of a product. Therefore, Rao et al. (1999) had developed this critical factor – process/product design. Process/product had also been identified as one of the critical factors of quality management in 4 other studies. The terms used by the researchers are different but all of them have included process and product design in the scope of the critical factors.

2.7.7 Supplier Quality
Supplier quality is an important dimension of quality management as defective incoming materials and parts lead to process and product quality problems. Leonard and Sasser (1992) found that purchased materials and parts often become the major contributors to quality problems (Leonard & Sasser, 1992 as cited in Flynn et al., 1994). Maintaining good supplier relationship is acknowledged as a key factor in maintaining competitive advantage. Many companies adopt the ‘supplier partnership’ perspective to achieve higher quality and faster response to market needs.

According to Stevenson 2007 a stable relationship with few dependable suppliers who can ensure high-quality supplies and uphold flexibility to changes in product specifications and delivery schedules was important to deliver good quality product (Stevenson, 2007, p.533). All the 7 research groups have identified supplier quality as a critical factor of quality management. Rao et al. (1999) developed a scale of 6 items to measure the effectiveness of a supplier quality management system that are namely importance placed on quality of purchased parts versus price, extent to which the company depends on a few reliable suppliers, level of technical support to suppliers, level of involvement of supplier in the company’s product development process, level of emphasis on long-term supplier relationships and clarity of specifications given to suppliers.
2.7.8 **Customer Orientation**
Rao et al 1999 stated that the main objective for a product or service design is to satisfy the customer while making a reasonable profit. Rao et al further affirmed that customers were the driving force for product and service design. A customer-oriented or a customer-focused organization maintains its competitive advantage in the marketplace. Doll and Vonderembse 1991 stated that in a customer-oriented organization, customer satisfaction influences all the company’s actions. Ahire et al 1996 affirmed that as customer expectations are dynamic, an organization needed to survey customer expectations regularly and modify its operations accordingly. Ahire et al 1996 further noted that the availability of customer complaint information to managers and the extent of the use of customer feedback to improve product quality reveal the level of customer focus in an organization.

2.8 **Conceptual Framework**

**Factors that contribute to Quality defects**

<table>
<thead>
<tr>
<th>Causes of quality defects</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Man power</td>
</tr>
<tr>
<td>• Management</td>
</tr>
<tr>
<td>• Machinery</td>
</tr>
<tr>
<td>• Material</td>
</tr>
<tr>
<td>• Methods</td>
</tr>
<tr>
<td>• Measurement</td>
</tr>
<tr>
<td>• Mother nature</td>
</tr>
</tbody>
</table>

**Cost of non-quality**

- Non-conforming product (product and package)
- Reject from the line
- Expired product
- Damaged product
- Poor raw material

Fig 2; Investigation into the sources of quality failure
CHAPTER 3

RESEARCH METHODOLOGY

3.1 Research Methodology

Research methodology summarises how the research was done on the investigation of sources of quality failure in the beverages industry, in which my focus was Delta Beverages. Key elements I dealt with were research design and the instruments used in data collection process. Validity and reliability of the research process are focused on as well. An important inclusion related to detail regarding Population, Sample and sampling procedures.

3.1.2 Research Design

This study on the investigation of sources of quality failure in the beverages industry, in which my focus was Delta Beverages used a quantitative approach that emphasises testing theories or concept through variable metric measurement and performing data analysis procedure with statistical tools and aim to test the hypothesis, (Sugiyono, 2008). The research design is a blueprint for conducting a study with maximum control over factors that may interfere with the validity of the findings (Burns and Grove 1997).

This study is on the sources of quality failure in the beverages industry focused on Delta Beverages, which is a leading beverages manufacturing concern. Only Delta beverages employees took part in the research. A research design was taken as a plan that describes how, when and where data are to be collected and analysed” (Parahoo, Barr, and McCaughan 2000). Data collection during my research considered the departments, age, experience, educational qualifications of the employees and any other internal qualifications through Delta training institutes and Mandel training centre. Delta Beverages invest so much into training of its employees.

Another definition considered research design as “the researcher’s overall approach for answering the research question (Polit and Beck, 2008). The researcher focused on the impact of machines, man, materials, methods, measurements and Mother Nature earth as sources of quality failure in the Beverages industry.

The plan is the overall scheme or program of the research and it includes an outline of activities the researcher undertook from writing propositions and their operational implications to the final analysis of data. (Saunders et al., 2009) demonstrated on how to
effectively carry out a research design through the use of a research ‘onion’ as depicted in Figure 3.1.

![Figure 3.1: The research ‘onion’](image)

When designing the research study, (Saunders et al., 2009) noted that research must first peel away the outer two layers of the ‘onion namely the research philosophies and the research approaches thus a way of depicting the issues underlying choice of data collection method or methods. The next three layers: research strategies, research choices and time horizons “can be thought of as focusing on the process of research design; that is, turning the research question into a research project,” (Robson, 2002). In summary, the way the researcher chose to answer the research questions was influenced by the positivism philosophy and deductive approach of quantitative analysis.

**3.1.3 Research Philosophy**

This study on the investigation of sources of quality failure in the beverages industry, in which my focus was Delta Beverages, used Positivist philosophy. According to (Saunders et al., 2009), the positivist advocates for adopting the philosophical stance of the natural
scientist similar to those produced by the physical and natural scientists’ (Remenyi et al., 2008). Quality in the Beverages manufacture involves science, thus measurement of gas volume, sugar concentration, taste, odour and appearance of the product against specifications. These quality parameters are determined by the 6M of manufacturing. The 6Ms help to look at the possible sources of quality failure. The 6Ms represents a search around the quality parameters of Delta Beverages products and systems. The positivist philosophy places emphasis on numerical analyses and objectivity, reliability and replication of findings. One will prefer working with an observable social reality and that the end product of such research can be law-like generalisations. An important component of the positivist approach to research is that the research is undertaken, as far as possible, in a value-free way.

The resources the researcher would claim to be external to the process of data collection in the sense that there is little that can be done to alter the substance of the data collected. Quality failure at Delta can occur independently of the researcher’s will. An assumption is that the researcher is independent of and neither affects nor is affected by the subject of the research (Remenyi et al., 1998). Only observable phenomena can provide credible data, facts. In the current case, observations of unfolding events as they occur in Delta Beverages’ natural settings were followed. Focus on causality and law like generalisations, reducing phenomena to simplest elements (Saunders et al., 2009). Thus, the researcher used structured methodology in order to facilitate replication (Gill and Johnson, 2002).

The researcher used statistical analysis and the Statistical Package of Social Sciences (SPSS) to analyse these quantifiable observations. The disadvantage is that it may not always suit social science, validity of findings reduced since social phenomena cannot be reliably measured. The research was undertaken in a value-free way; the researcher was independent of the data and maintained an objective stance.

3.1.4 Research Approach

(Saunders et al., 2009) states that there are two approaches that can be followed when carrying out research; these are, deductive and inductive approach. The researcher used the deductive approach where he collected the data and then developed theory as a result of the data analysis. This is the dominant research approach in the natural sciences, where laws
present the basis of explanation, allow the anticipation of phenomena, predict their occurrence and therefore permit them to be controlled (Collis and Hussey 2003).

3.2 Research Strategy

According to Yin (2003) strategies can be employed in research studies and each strategy can be used for exploratory, descriptive and explanatory research. The researcher’s main focus was not on the strategy, but on whether the research answered the research questions and met the objectives. The choice of research strategy was guided by the research questions and objectives, and the extent of existing knowledge from literature. The amount of time and other resources available, and the philosophical underpinnings were major determinants of the research outcomes. Therefore, these strategies are not being mutually exclusive but affected one another.

This research study adopted a single exploratory case study strategy by investigating the source of quality failure in Delta Cooperation. This research is important to Delta Beverages as it will establish the source of quality defects for Delta Beverages. This will mean taking a more proactive role with regards to Quality and ensuring that quality assurance is implemented to control losses due to non-quality. Meeting and surpassing customer expectations on quality entails growth of new brands and products hence increase sales volume and profitability.

It is important to emphasise the need for the causes of quality defects/complaints to be investigated and determined, and that appropriate preventative actions are put in place to guard against a recurrence of the issue. Clarifying expectations and responsibilities in relation to the reporting of quality defects to the Supervisory Authority is of great importance.

Effective quality management will enable Delta Beverages to identify its strengths, opportunities, weaknesses and threats then plan accordingly to ensure that quality objectives are achieved to defend and grow its market share. Quality assurance will be a key to unlocking potential in profitability growth on long established brands and infant brands. The reduced cost of manufacturing due to first time quality assurance will mean reduced price of products, higher profit margins and high sales volumes thus ultimately improving profitability. This will definitely mean shareholder value preservation and perpetual growth.
of the business. With the high investments in plant and equipment that Delta has done in the past four years, it is important for Delta to report considerably high profits year on year.

3.2.1.1 Case study

A case study is a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence’ (Robson, 2002) and (Saunders et al., 2009). A case study is also defined as an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident (Yin, 2003). This case study was an explanatory and exploratory research, and it sought to explain and explore the source of quality defects for Delta Beverages.

For the current case study which represents critical and unique case, it provided the researcher with an opportunity to observe and analyse a quality defects phenomenon that only a few have considered before. Inevitably, an important aspect of using a single case is defining the actual case (Robson, 2002).

3.2.2 Research methodology

Consequently, if you are using a case study strategy you are likely to need to use and triangulate multiple sources of data (Yin, 2003). Due to the time allocated to the study the researcher used the quantitative research methodology. Structured questionnaires were administered to the different departments (sales, procurement, packaging, production and quality), and the sample was made up of different strata based on age, department, work experience and qualifications, and these were not mutually exclusive.
3.3 Research Choices

The two main research choices are the mono-method and multiple methods (Saunders et al., 2009). The researcher used the mono-method of a questionnaire self administered survey due to the time resource limitation. The multiple methods are useful if they provide better opportunities for you to answer your research questions and where they allow you to better evaluate the extent to which your research findings can be trusted and inferences made from them (Tashakkori and Teddlie, 2003).

3.3.1 Time Horizons

The two time dimensions which a study can be carried out are the cross-sectional and longitudinal (Saunders et al., 2009). The cross-sectional studies refer to the study of a particular phenomenon (or phenomena) at a particular time (snapshot) while longitudinal studies are repeated over an extended period (diary perspective) (Blumberg et al., 2008) and Saunders et al. (2009). This research was conducted within eight months and a cross-sectional study was the only practical alternative due to the time available.

3.5 Data Collection

A research carried out using the deductive approach is highly structured in order to facilitate replication (Gill and Johnson, 2002). Data collection techniques most often used for positivism are characterised by large samples and quantitative in-depth investigations (Saunders et al., 2009). The data was collected using a self administered structured questionnaire, from properly constituted and representative sample.
1.7.3 Population and Sampling

1.7.3.3 Population

The target population was Delta Beverages employees from all branches and Delta subsidiaries, comprised of different departments namely Operations (Production, Quality, Sales and Engineering departments. The decision to choose these departments was based on first; Production department is the one that produces the final product, starting from syrup preparation up to final product packaging where quality defect product is produced.

Quality department is the one that is involved with quality control and assurance during production to ensure good quality product is produced. The quality department does all the incoming inspection of all raw materials that goes into the product to ensure good quality final product. These raw materials include, sugar concentrates, sugar, carbon dioxide and water, thus any quality deviations from the raw materials means product quality defect. The quality department has the mandate of the Franchise owners Coca Cola Company to ensure adherence to set quality standards are adhered to. In the event of any non conforming product being produced the quality departments isolate and ensure destruction of all quality defect products.

The Engineering department has the mandate of ensuring the smooth running, maintenance of production equipment. The engineering department keeps and implement maintenance schedules of all packaging equipment. All this is in an effort to ensure machines operate at rated machine capacity and produce good quality products.

Sales and distribution departments’ takes the final product to the market, this product must be good quality products that secures market share and drives sales revenue and ultimately profit. Product quality defects means high market returns and loss to the business. Any form of poor product handling in trade or during distribution means product quality defects.

3.6.2 Sample size

The researcher used the occupational report record of employees complied by the Delta Beverages human resources department as the sampling frame. This occupational report has details of the employee number, names and leave days balance thus all engineering, production, sales, quality and procurement are recorded in the occupational report thus making it easier to the stratified random sampling. The researcher ensured to attain a sampling frame of not less than 43% of the population.
Table 3.1 Sample composition by department and education

<table>
<thead>
<tr>
<th>Department and Education demographics</th>
<th>O’ &amp; A’ Level</th>
<th>Certificate</th>
<th>Diploma</th>
<th>Degree</th>
<th>Postgraduate degree</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>5</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>0</td>
<td>16</td>
<td>9%</td>
</tr>
<tr>
<td>Packaging</td>
<td>4</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>7</td>
<td>4%</td>
</tr>
<tr>
<td>Procurement</td>
<td>20</td>
<td>8</td>
<td>12</td>
<td>5</td>
<td>1</td>
<td>46</td>
<td>26%</td>
</tr>
<tr>
<td>Production</td>
<td>14</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>2</td>
<td>28</td>
<td>16%</td>
</tr>
<tr>
<td>Quality</td>
<td>6</td>
<td>9</td>
<td>6</td>
<td>5</td>
<td>2</td>
<td>28</td>
<td>16%</td>
</tr>
<tr>
<td>Sales</td>
<td>20</td>
<td>12</td>
<td>14</td>
<td>6</td>
<td>0</td>
<td>52</td>
<td>29%</td>
</tr>
<tr>
<td>Total</td>
<td>69</td>
<td>35</td>
<td>43</td>
<td>24</td>
<td>6</td>
<td>177</td>
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<tr>
<td>Percentage</td>
<td>39%</td>
<td>20%</td>
<td>24%</td>
<td>14%</td>
<td>3%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3.6.3 Sampling Techniques

Stratified random sampling is used when sub populations within the overall population vary (Yin, 2003). It is often applied when the researcher wants to select a sample that represents the whole population across many traits. Stratification is the process of dividing members of the population into uniform subgroups before sampling (Golafshani, 2003). The strata used in this research are departments and are mutually exclusive, that is, every element in the population was assigned to one stratum. The strata were collectively exhaustive, and no population element can be excluded. All the department at Delta Beverages were included which are sales, quality, procurement, production and packaging. Then a simple random sampling was applied within each stratum. This improved the representativeness of the sample and reduced the sampling error.

3.6.4 Data Collection Techniques

The data collection instrument was the self administered structured questionnaire.

3.6.5 The Questionnaire

The main qualities of a well-structured questionnaire are its ability to provide information being sought and the respondents’ acceptability (Golafshani, 2003). All in all, the entire instrument must not give problems during the data analysis and the interpretation stages. The questionnaire consisted mainly of closed ended items. The closed-ended items provided a predetermined set of answers for respondents’ selection. This questionnaire approach enabled the researcher to solicit quick responses from the sample population on the investigation of
causes of quality failure in the beverages industry. The questionnaire was designed for only Delta Beverages employees, capturing their department, age, work experience, etc. The closed ended questions will allow for collection of data easy to code and quantify. The inclusion of open-ended items was intended to solicit any further points of clarification and additional contribution on the research questions.

3.6.6 Secondary data
The secondary data that I used in the research was sourced from consumer complaints from the past 2 years.

3.7.1 Data Presentation and Analysis
For easier understanding and comprehension, diagrams and tables were used to present the data. Diagrams provide an alternative means for people to connect with information and process its significance (Tashakkori and Teddlie, 2003). In this study, graphs, tables and narratives were used for the analysis. The Statistical Package for Social Scientists (SPSS) was used to analyse the data from this study. Data types were recorded using numerical codes and this enabled the data to be quickly entered using the numeric keypad on the keyboard, and with fewer errors. Subsequent analyses, in particular those that require re-coding of data for the creation new variables, are made more straightforward (Saunders, 2009).

3.8.1 Validity & Reliability
Validity is a measurement on how truly a phenomenon under scrutiny is reflected in the response (Yin, 2003). Validity refers to the extent to which a test measures what it is meant to measure (Golafshani, 2003). Reliability entails dependability, consistency, stability of the questionnaire and how consistently it measures the constructs of the conceptual framework. Reliability refers to the extent to which data collection techniques or analysis procedures will yield consistent findings (Saunders et al., 2009).

3.8.2 Content Validity
When the research sought to find out if the entire content of the area is represented in the test, the test task is compared with the content of the behaviour. The researcher should personally be involved in the distribution and administering of questionnaires (Golafshani, 2003). The researcher is the one distributed and administered the questionnaires to Delta Beverages employees.
3.8.3 Face Validity
Basically face validity refers to the degree to which a test appears to measure what it purports to measure (Saunders et al., 2009), and in this regard the researcher undertook a pilot study to test the questionnaires.

3.8.4 Reliability
Measurements are reliable to the extent that they are repeatable and that any random influence which tends to make measurements different from circumstance to circumstance or occasion to occasion or to the source of measurement error (Golafshani, 2003). The questionnaires contained structured closed ended questions with guided categorical responses to ensure reliability.

3.9 Ethical Considerations
To ensure confidentiality and anonymity and that the respondents’ views are not exposed to the public domain the researcher collected, stored and used the data in a manner that no one understands who contribute what. Furthermore, no names were collected and used on any questionnaire. All the confidentially clauses were explained to the respondent before responding to the questionnaire.

3.10 Limitations
Data collection could not be done covering the whole Delta Corporation sites because of the costs involved; hence it was confined to major plant namely, Sparkling Beverages Granite side, which might not necessarily represent the Delta Corporation. However the researcher ensured that the sample was representative enough by using stratified sampling method with departments as strata.
CHAPTER 4

RESEARCH FINDINGS AND PRESENTATIONS

4.0 Introduction

This chapter dwells on the research results presentation, analysis, interpretation and discussion. These are all based on the research objectives stated in chapter 1, and the methodology as described in chapter 3.

4.1 Demographics

Table 4.1 Years of experience, Gender and response rate

<table>
<thead>
<tr>
<th>Years of Experience</th>
<th>Gender</th>
<th>Total</th>
<th>Targeted</th>
<th>Response Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-10 years</td>
<td>58</td>
<td>8</td>
<td>66</td>
<td>70</td>
</tr>
<tr>
<td>10-20 years</td>
<td>55</td>
<td>23</td>
<td>78</td>
<td>80</td>
</tr>
<tr>
<td>20-30 years</td>
<td>9</td>
<td>9</td>
<td>18</td>
<td>20</td>
</tr>
<tr>
<td>30-40 years</td>
<td>9</td>
<td>5</td>
<td>14</td>
<td>25</td>
</tr>
<tr>
<td>40-50 years</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>132</td>
<td>45</td>
<td>177</td>
<td></td>
</tr>
<tr>
<td>Targeted</td>
<td>150</td>
<td>50</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>Response Rate</td>
<td>88%</td>
<td>90%</td>
<td></td>
<td>89%</td>
</tr>
</tbody>
</table>

There was an 89% overall response rate, with the 88% male response rate 90% for females. There were more male respondents than females. This might be that it is male dominated industry and the male respondents were easily accessible. The highest response rate (98%) was from those between 10-20 years of experience. This was the most cooperating group and has stayed long enough at the company and has a better understanding of the industry. This increased the validity of the data collected. The importance of a high response rate is that it ensures that the sample is representative (Saunders, 2009).
Table 4.2 Department, Education demographics

<table>
<thead>
<tr>
<th>Department</th>
<th>O' &amp; A' Level</th>
<th>Certificate</th>
<th>Diploma</th>
<th>Degree</th>
<th>Postgraduate degree</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>5</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>0</td>
<td>16</td>
<td>9%</td>
</tr>
<tr>
<td>Packaging</td>
<td>4</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>7</td>
<td>4%</td>
</tr>
<tr>
<td>Procurement</td>
<td>20</td>
<td>8</td>
<td>12</td>
<td>5</td>
<td>1</td>
<td>46</td>
<td>26%</td>
</tr>
<tr>
<td>Production</td>
<td>14</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>2</td>
<td>28</td>
<td>16%</td>
</tr>
<tr>
<td>Quality</td>
<td>6</td>
<td>9</td>
<td>6</td>
<td>5</td>
<td>2</td>
<td>28</td>
<td>16%</td>
</tr>
<tr>
<td>Sales</td>
<td>20</td>
<td>12</td>
<td>14</td>
<td>6</td>
<td>0</td>
<td>52</td>
<td>29%</td>
</tr>
<tr>
<td>Total</td>
<td>69</td>
<td>35</td>
<td>43</td>
<td>24</td>
<td>6</td>
<td>177</td>
<td></td>
</tr>
<tr>
<td>Percentage</td>
<td>39%</td>
<td>20%</td>
<td>24%</td>
<td>14%</td>
<td>3%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There majority of the respondents were those from the shop work who are holders of O’ Level and A’ level certificates (39%), then the followed by the diploma (24%), because the large departments of engineering and sales have diploma holders. This was reflected by the sales and procurement with 29% and 26% respectively. The research’s response rate was high and therefore the sample was a representative. The demographic information provides the research on whether the participants and individuals are a representative sample of the target population (Bryman, 2009).

4.3 To establish whether materials used in Beverage manufacture is the source of quality defects

Table 4.3 Reliability Statistics

<table>
<thead>
<tr>
<th>Cronbach's Alpha</th>
<th>No of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>.795</td>
<td>10</td>
</tr>
</tbody>
</table>

The Cronbach’s alpha = 0.795 which lies in the acceptable range of reliability, 0.7 to 0.9 (Golafshani, 2003). The ten questions which sort to establish whether materials used in Beverage manufacture as a quality defects are reliable. Reliability entails consistency, dependability, stability of the interview guide in consistently measuring the constructs in the conceptual framework. Reliability refers to the extent to which data collection techniques or analysis procedures will yield consistent findings (Saunders et al., 2009).
<table>
<thead>
<tr>
<th>Department</th>
<th>Frequency of Quality Defects</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Daily</td>
<td>Monthly</td>
</tr>
<tr>
<td>Engineer</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>% within Department</td>
<td>.0%</td>
<td>68.8%</td>
</tr>
<tr>
<td>Packaging</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>% within Department</td>
<td>100.0%</td>
<td>.0%</td>
</tr>
<tr>
<td>Procurement</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>% within Department</td>
<td>6.5%</td>
<td>65.2%</td>
</tr>
<tr>
<td>Production</td>
<td>0</td>
<td>21</td>
</tr>
<tr>
<td>% within Department</td>
<td>.0%</td>
<td>75.0%</td>
</tr>
<tr>
<td>Quality</td>
<td>0</td>
<td>21</td>
</tr>
<tr>
<td>% within Department</td>
<td>.0%</td>
<td>75.0%</td>
</tr>
<tr>
<td>Sales</td>
<td>11</td>
<td>29</td>
</tr>
<tr>
<td>% within Department</td>
<td>21.2%</td>
<td>55.8%</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td>112</td>
</tr>
<tr>
<td>% within Department</td>
<td>11.9%</td>
<td>63.3%</td>
</tr>
</tbody>
</table>

100% of the packaging department personnel have encountered the highest the frequency of quality defects on a daily basis, because they are the ones responsible for the beverage production. Packaging material (crowns, closures, PET bottles and pre-forms) are processed by the production department. 68.3% of the engineering department has encountered these quality defects on a monthly basis because it is mainly focused on breakdown and preventative maintenance and is only affected by the spare parts from original equipment material manufacturer or counterfeit spares. 25% of the quality department has encountered the quality defects on a weekly basis and 75% of them on an average monthly frequency of defects because the beverage quality analysis checks through sampling during production. The other aspect is that the product market sampling and quality analysis is done on a weekly basis. 55.8% of sales have monthly frequency of quality defects because it is mainly focused on sales and pushing volumes and rarely concentrate on quality.

Flynn (1994) stated quality is shared by every function where errors, problems, and defects should be attributed to those who cause them, not the quality department. According to Rao
(1999) quality is conformance to requirements and must be clearly stated so that they cannot be misunderstood. “The only performance standard is Zero Defects.” Porter (1996) stated that the quality of the end product depends upon the quality of its constituent parts and materials. Integrity in the supply chain depends upon the parties involved honouring their commitment and having the capability to delivering quality product on time.

<table>
<thead>
<tr>
<th>Table 4.5 Chi-Square and Cramer’s V Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Value</strong></td>
</tr>
<tr>
<td>Pearson Chi-Square</td>
</tr>
<tr>
<td>Cramer’s V</td>
</tr>
</tbody>
</table>

The Pearson Chi-square test p-value = 0.000 < 0.05, which shows that there is a relationship between the department and the frequency of quality failure. The Cramer’s V =0.437, which shows a fairly strong relationship. This shows that departments like sales has little to do with quality but focus on increasing sales volume and market share. This is contrast with the production, quality and engineering which require constant quality control and assurance. According to Hayes (2008), it is a common occurrence that sales department’s performance is measured by the volumes sold, so it rarely focuses on quality control.
The majority (41.8%) agrees and (37.3%) strongly agree that raw material quality has an impact on production quality defects. Supplier quality is an important dimension of quality management as defective incoming materials and parts lead to process and product quality problems. Leonard and Sasser (1992) found that purchased materials and parts often become the major contributors to quality problems (Leonard & Sasser, 1992 as cited in Flynn et al., 1994). Maintaining good supplier relationship is acknowledged as a key factor in maintaining competitive advantage.

**Table 4.6 Department vs. Raw Materials Quality Impact Cross-tabulation**

<table>
<thead>
<tr>
<th>Raw Material Quality Impact</th>
<th>Engineer</th>
<th>Count</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>10</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>% within Department</td>
<td></td>
<td></td>
<td>6.2%</td>
<td>.0%</td>
<td>6.2%</td>
<td>62.5%</td>
<td>25.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Packaging</td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>7</td>
</tr>
</tbody>
</table>
The majority of the production department (50%) agrees, (50%) strongly agree that raw material quality has an impact of the production of quality defects products. The procurement department (15.2%) has divided view on material impact on quality defects since some are not directly involved in quality control and beverage production. Stevenson, (2007) stated that there are a few dependable suppliers who can ensure high-quality supplies and uphold flexibility to changes in product specifications and delivery schedules. According to Rao et al. (1999) supplier quality as a critical factor of quality management.

<table>
<thead>
<tr>
<th>Department</th>
<th>Count</th>
<th>% within Department</th>
<th>Count</th>
<th>% within Department</th>
<th>Count</th>
<th>% within Department</th>
<th>Count</th>
<th>% within Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procurement</td>
<td>2</td>
<td>4</td>
<td>7</td>
<td>19</td>
<td>14</td>
<td>46</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>14</td>
<td>14</td>
<td>28</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>17</td>
<td>5</td>
<td>28</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales</td>
<td>2</td>
<td>7</td>
<td>7</td>
<td>14</td>
<td>22</td>
<td>52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>11</td>
<td>18</td>
<td>74</td>
<td>66</td>
<td>177</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The Pearson Chi-square test p-value = 0.002 < 0.05, which shows that there is a relationship between the department and the frequency of quality failure. The Cramer’s V =0.245, which shows a fairly weak relationship. This shows that a department like procurement has a divided opinion. In a customer-oriented organization, customer satisfaction influences all the company’s actions (Doll &Vonderembse, 1991, as cited in Rao et al., 1999).
As customer expectations are dynamic, an organization needs to survey customer expectations regularly and modify its operations accordingly (Shepatuk, 1991, as cited in Ahire et al., 1996). The availability of customer complaint information to managers and the extent of the use of customer feedback to improve product quality reveal the level of customer focus in an organization. The procurement department in conjunction with other departments will work hand in hand to ensure that the feedback information is used in quality control including the quality from receivables from suppliers.

4.4 To investigate if machinery is the source of quality defects for the beverages industry

<table>
<thead>
<tr>
<th>Table 4.8 Reliability Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cronbach's Alpha</td>
</tr>
<tr>
<td>------------------</td>
</tr>
<tr>
<td>.746</td>
</tr>
</tbody>
</table>

The Cronbach’s alpha = 0.746 which lies in the acceptable range of reliability, 0.7 to 0.9. The ten questions which sort to investigate if machinery is the source is quality defects for the beverages industry.

<table>
<thead>
<tr>
<th>Table 4.9 Experience vs. Installation of New machinery to Improve Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experience</td>
</tr>
<tr>
<td>------------</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Experience</td>
</tr>
<tr>
<td>0-10 years</td>
</tr>
<tr>
<td>% within Experience</td>
</tr>
<tr>
<td>10 - 20 years</td>
</tr>
<tr>
<td>20-30 years</td>
</tr>
<tr>
<td>% within Experience</td>
</tr>
<tr>
<td>30-40 years</td>
</tr>
<tr>
<td>40- 50 years</td>
</tr>
</tbody>
</table>

The majority 88.7% of agree that the installation of new machinery improves the quality of products, with those who have 10-20 years of experience having a 91%, and 40 to 50 years, with a 100% agreement. According to Ahire et al., (2006), machines extend the capability of
personnel who depend on them to achieve the results required. Rao et al., (1999) stated that neglecting the machines will reduce an organization’s capability and adversely affect results. Ahire et al., (2006), added that doing things in the best way is about doing things efficiently, using the most appropriate machine, tool, technique, solution or approach to do a particular job and not wasting time and other resources unnecessarily.

Chart 4.2.2 Implementation Quality system eliminate quality defect

The majority 42.4% agree, 27.7% strongly agree that implementation of quality system eliminate quality defects. Although quality information availability was not included as one of the critical factors of quality management in Ahire’s study (Ahire et al., 1996) quality information usage was considered as one of the critical factors of quality management. The study evaluated quality information is based on quality data to managers, which will result in quality systems.
The Majority (27.1%) agree or (23.2%) strongly agree ISO certification, however 41.2% are neutral because of lack of knowledge due to inadequate training. According to Heizer and Render (2009), quality has become so important that the world is uniting around a single quality standard that is ISO 9001, which is the internationally recognised Quality Monitoring Scheme standard and globally it’s the most applied standard. Poksinska et al (2002), defined ISO 9001 as a family of standards which relate to QMS and are designed to assist organisations in meeting their customers’ and stakeholder’ needs. According to the study done by Chikuku. et al (2012), ISO 9001 has a positive effect and increases competitiveness in capacity utilisation, product development, employee pride and motivation, overall equipment effectiveness, provision of adequate tools to employees and revenue per employee.
4.5 To establish the relationship between personnel and quality defects
production

Table 4.10 Reliability Statistics

<table>
<thead>
<tr>
<th>Cronbach's Alpha</th>
<th>N of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>.799</td>
<td>8</td>
</tr>
</tbody>
</table>

The Cronbach’s alpha = 0.799 which lies in the acceptable range of reliability, 0.7 to 0.9. The eight questions which sort to establish the relationship between personnel and quality defects production are reliable.

Table 4.11 Experience vs. Personnel, training and competences contribute
to quality failure

<table>
<thead>
<tr>
<th>Experience</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>COUNT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-10 years</td>
<td>Count</td>
<td>1</td>
<td>10</td>
<td>14</td>
<td>22</td>
</tr>
<tr>
<td>% within</td>
<td>Experience</td>
<td>1.5%</td>
<td>15.2%</td>
<td>21.2%</td>
<td>33.3%</td>
</tr>
<tr>
<td>10 - 20 years</td>
<td>Count</td>
<td>2</td>
<td>17</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>% within</td>
<td>Experience</td>
<td>2.6%</td>
<td>21.8%</td>
<td>25.6%</td>
<td>19.2%</td>
</tr>
<tr>
<td>20-30 years</td>
<td>Count</td>
<td>1</td>
<td>7</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>% within</td>
<td>Experience</td>
<td>5.6%</td>
<td>38.9%</td>
<td>27.8%</td>
<td>16.7%</td>
</tr>
<tr>
<td>30-40 years</td>
<td>Count</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>% within</td>
<td>Experience</td>
<td>.0%</td>
<td>21.4%</td>
<td>14.3%</td>
<td>64.3%</td>
</tr>
<tr>
<td>40- 50 years</td>
<td>Count</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>% within</td>
<td>Experience</td>
<td>.0%</td>
<td>.0%</td>
<td>100.0%</td>
<td>.0%</td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td>3</td>
<td>37</td>
<td>42</td>
<td>49</td>
</tr>
<tr>
<td>% within</td>
<td>Experience</td>
<td>1.7%</td>
<td>20.9%</td>
<td>23.7%</td>
<td>27.7%</td>
</tr>
</tbody>
</table>

The majority (27.7%) agrees or (25.4%) strongly agree that personnel, training and competences contribute to quality failure, while only 1.7% strongly disagrees. However, 10-20 years experience has a 21.8% disagree which is quite significant, which shows that a competence acquisition program implementation is key in reducing this number. David Hoyle (2009) training is intended to deliver skills but
often it only delivers an experience. As with knowledge, acquired skills are of no use if the incumbent cannot use them to deliver the right results. According to David Hoyle (2009) successful quality program depends on networking and training activities through quality councils, formal educational training, and professional certification within the organization.

![Experience significantly reduce rate of Quality defects](chart.png)

**Chart 4.4.4 Experience significantly reduce rate of Quality defects**

There is a 25.4% disagree that experience significantly reduce quality defects, these are mainly technological oriented younger employees who believe in new technology coming through. The 43.5% neutral reflect that some of the respondents are from different departments and not acquainted to operations. There is a considerable percentage (13.6%) agree and (15.8%) who strongly agree that experience is important. According to Garvin (2007) Training is intended to deliver skills but often it only delivers an experience. As with knowledge, acquired skills are of no use if the incumbent cannot use them to deliver the right results.
Chart 4.5.5 Team engagement reduce quality defects

The majority either agrees (48.6%) or strongly agrees (24.9%), that team work and engagement is vital to the reduction of quality defects. This shows that an increase to departmental linkages and corporation will promote a reduction in quality defects. According to Rommel (1996), quality improvement teams composed on members of each department or function with all necessary tools can deliver quality measurement to monitor the status and improvement of activities. Zeitz et al. (1997), stated that team goal setting will bring team engagement and team commitment to achieve set goals.

4.5 To establish the relationship between Quality systems, methods and quality defects

<table>
<thead>
<tr>
<th>Department</th>
<th>Quality control reduce quality defects</th>
<th>Total</th>
</tr>
</thead>
</table>

43
The majority either agrees (32.2%) or strongly agrees (40.7%), that quality control reduce quality defects. However, the procurement department has a divided view, and this might be to the fact of their lack direct exposure to the quality control process. Juran (2008) defined quality as fitness for use. Jurans’ focus was on trilogy quality planning, quality control and quality improvement. Crosby (2007) defined quality as conformance to requirements or specifications. Crosby identified 14 steps for zero defect quality improvement plans to achieve performance improvement (Kruger, 2001). According to Deming (2003) the importance of total quality control is to improve organisation performance, his major contribution was in the area of using a cause and effect diagram (Ishikawa diagram) in diagnosing quality issues (Kruger, 2001).
Chart 4.6.6 Management commitment eliminate quality defects

From the graph above the engineering management’s commitment to maintenance practices so as to improve product quality is limited. There is 51.4% who disagree that the engineering management is committed to good maintenance practices. However there is 26.6% who strongly agree and these might be some of the engineering managers who participated in the research.

According to Flynn et al., (2004) preventive maintenance encompasses the prevention costs include the following activities: design reviews, product qualification, drawing checking, engineering quality orientation, quality improvement programs, supplier evaluations, supplier training, specification reviews, operating training, quality orientations, acceptance planning and quality audits. According to Joseph et al., (1999) it vital that the engineering department be committed to maintenance practices for it improves the final product quality.
Chart 4.7.7 Installation of new equipment to replace old equipment improve quality

From the entire respondents 88.7% agreed that new machinery installation improves the quality of the production process and the products. Only 11.3% of the respondents disagreed. This mean that all the stakeholders in the manufacturing industry generally agree that up to date and new machinery are vital for production efficiency. According to Flynn et al., (2004) machinery extends the capability of personnel whom depend on them so as to achieve the desirable results. Neglecting the machines and malfunctioning machines will reduce an organisation’s capability and adversely affect results.

4.6 Chapter conclusion

The research findings generally agreed with the existing literature, and quality defects are caused by quality systems and methods coupled with machinery .age, maintenance and man power competences
CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter concludes the research and provides the recommendations with might be used in the future production processes, and some of the findings will add to the board of knowledge. Areas of further studies are also suggested in this chapter.

5.1 Conclusions

These conclusions are based on the research objects and derived from the literature review and the research findings.

5.1.1 To establish whether materials used in Beverage manufacture is the source of quality defects

The packaging department personnel have encountered the highest frequency of quality defects on a daily basis, because they are the ones responsible for the beverage production. Packaging material is processed by the production department. The engineering department has encountered these quality defects on a monthly basis because it is mainly focused on breakdown and preventative maintenance and is only affected by the spare parts from original equipment material manufacturer or counterfeit spares.

Quality is shared by every function where errors, problems, and defects should be attributed to those who cause them, not the quality department. Supplier quality is an important dimension of quality management as defective incoming materials and parts lead to process and product quality problems. Maintaining good supplier relationship is acknowledged as a key factor in maintaining competitive advantage. In a customer-oriented organization, customer satisfaction influences all the company’s actions. The procurement department in conjunction with other departments will work hand in hand to ensure that the feedback information is used in quality control including the quality from receivables from suppliers.

5.1.2 To investigate if machinery and maintenance is the source of quality defects for the beverages industry
The majority agreed that the installation of new machinery improves the quality of products. Machines extend the capability of personnel who depend on them to achieve the results required. Neglecting the machines will reduce an organization’s capability and adversely affect results. The study evaluated quality information is based on quality data to managers, will result in quality systems. The Majority agree that ISO certification is important and ISO 9001 has a positive effect and increases competitiveness in capacity utilisation, product development, employee pride and motivation, overall equipment effectiveness, provision of adequate tools to employees and revenue per employee.

5.1.3 To establish the relationship between personnel, management and quality defects production

The majority agrees that personnel experience, training and competences contribute to quality systems, which shows that a competence acquisition program implementation is important. Quality program depends on networking and training activities through quality councils, formal educational training, and professional certification within the organization. Training is intended to deliver skills but often it only delivers an experience. As with knowledge, acquired skills are of no use if the incumbent cannot use them to deliver the right results. The majority either agrees that teamwork and engagement is vital to the reduction of quality defects. This shows that an increase to departmental linkages and corporation will promote a reduction in quality defects.

5.1.4 To establish the relationship between Quality systems, methods and quality defects

The majority agrees that quality control reduce quality defects. However, the procurement department has a divided view, and this might be to the fact of their lack of direct exposure to the quality control process. Importance of total quality control is to improve the organisation performance. The engineering management’s commitment to maintenance practices also improves the product quality.

5.2 Recommendations

5.2.1 Material quality processing recommendation
• The quality and procurement department should carry out unannounced supplier
quality surveillance audit (quality assurance and control practises, and Standard
Operating Procedures (SOPs)), and food safety standards and practises.
• Implementation of ISO systems of each and every supplier
• The procurement team must carry out quality control at source (incoming raw
material analysis and inspection)
• Full understanding of coca cola operating requirements in regards to material
incoming inspection and analysis.
• Compile a delta approved supplier list with compliance to quality standards.

5.2.2 Machine maintenance recommendation
• The Engineering department must carry out effective maintenance scheduling and
adherence tracking.
• The equipment supplier must be reputable in providing robust equipment, which are
benchmarked with international beverage industries

5.2.3 Quality methods recommendations
• Alignment of sales department, engineering, packaging and procurements
• The product quality, quality control and quality assurance procedure. For this is
during processing and for sales this is in the market (final product handling)
• Full management commitment across the value chain (from raw materials up the final
products on the selves).
• Focus on customer feedback and aligning to customer expectation
• Bench marking with the best in class regionally and internationally in the beverage
industry
• Quality control at source implementation and evaluation in each department

5.2.4 Personnel development recommendation
• Detailed diagnostic competence assessments focused on quality in each
department.
• Compiling a competence gap list for each individual.
• Carry out individual development plans from all departments (Engineering, sales,
procurement, packing and production) that will close all the competence gaps.
• After the competence acquisition process, then the formal on the job coaching
will follow.
• Management commitment and review of the competence acquisition process.

5.3 Further areas of study

1. The management’s perception on enterprise risk in the production sector with a focus on quality

2. How different gender’s perception on risk effects of quality systems

3. Market focus in quality assurance


Appendix

DANMORE DANAI KOKERA
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AN INVESTIGATION INTO THE SOURCE OF QUALITY FAILURE IN THE BEVERAGES INDUSTRY. A CASE OF DELTA CORPORATION”

I am a graduate student at University of Zimbabwe studying for my master’s degree in Business Administration. The attached survey is part of my dissertation research, which is a requirement for the completion of the degree. The survey is intended to sample opinions of employees on their perception of the causes of quality defects in the beverages industry. It involves individual perceptions of the impact of the 6Ms of production. In this regard, there is no right or wrong answers to the questions on this survey; the survey is only interested in your views as they relate to you in the different scenarios presented. The researcher is not interested in your identity, and all information provided will be used solely for the purpose of this study. For each question, please simply circle the letter by the response that best represents your view. Thank you very much for your time and cooperation.
For any clarifications and further information, feel free to contact the researcher on

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Section A

Background Information

A₁ Age: ________________

A₂ Gender: Male [ ] Female [ ]

A₃ Department __________________________

A₄ what is the highest level of education you have reached? ________________________

A₅ How long have you been working for this organisation? ________________

Section B

How machinery result in quality defects during production

B₁ Have you ever had quality defects in your area? a. Yes ( ) b. No ( )

B₂ What is your frequency quality defects review? _____________

B₃ Does the age of the bottling machinery affect quality of the product coming out? a. Yes ( )
b. No ( ) Please explain.................................................................
B5 Does the machine supplier and make have an impact on the quality of product? a. Yes ( )
b. No ( ) Please explain.................................................................

B6 Is machine maintenance significant contributor of quality defects [ ] Yes [ ] No[ ] :Please
explain.................................................................

B7 Does installation of new filler on a old line improve quality defects? a. Yes ( ) b. No ( ) :
Please explain.................................................................

Section C

On a scale of 1-5 how will you rate your level of agreement with the listed variables

Impact of materials on quality defects

(1- Strongly disagree, 2 – Disagree, 3 - Neutral, 4 – Agree, 5 - Strongly Agree)

C2 Raw materials incoming inspections are important at prevent quality defects [1] [2]
C3 Raw materials suppliers ISO 9000 certification is important in reducing quality
C5 Supplier partnership have an impact on quality defects [1] [2] [3] [4] [5]

Section D

Impact of methods on quality defects

On a scale of 1-5 how will you rate your level of agreement with the listed variables

(1- Strongly disagree, 2 – Disagree, 3 - Neutral, 4 – Agree, 5 - Strongly Agree)

D1 SOPs too long to follow during quality analysis [1] [2] [3] [4] [5]
D2 Quality control at source reduce quality defects during production [1] [2] [3] [4] [5]
D3 Use of modern quality control methods and equipment reduce quality defects [1] [2]
D4 Failure to follow laid down methods or procedures result in quality defects [1] [2] [3]
[4] [5]
D5 inter lab error control and benchmarking on methods reduce quality defects [1] [2]
The implementation of systems (ISO 9001, FSSC 22000,) is important in eliminating quality defects [1] [2] [3] [4] [5]

Use of data and problem solving tools significant in elimination of quality defects [1] [2] [3] [4] [5]

Section E

Significance of man on quality defects

On a scale of 1- 5 how will you rate the magnitude of man on quality defects

[1- Strongly disagree, 2 – Disagree, 3 - Neutral, 4 – Agree, 5 - Strongly Agree]

E1 My training ensures that quality defects are reduced to minimal levels [1] [2] [3] [4] [5]
E2 My experience is significant to the rate of quality defects coming out of the line [1] [2] [3] [4] [5]
E3 My educational qualification contribute significantly to the reduction of quality defects [1] [2] [3] [4] [5]
E4 Loss of skilled artisans has greatly contributed to high quality defects [1] [2] [3] [4] [5]
E5 My team engagement and motivation has no impact on quality reduction defect during production [1] [2] [3] [4] [5]

Section F

Management commitment on quality defects

On a scale of 1- 5 how will you rate the commitment of management in reduction of quality defects

[1- Strongly disagree, 2 – Disagree, 3 - Neutral, 4 – Agree, 5 - Strongly Agree]

F1 Management is committed to elimination of quality defects [1] [2] [3] [4] [5]
F2 Management is focused on pushing volumes only with no consideration of quality defects [1] [2] [3] [4] [5]
F3 Management is worried by cost of non-quality due to defects and the cost is communicated [1] [2] [3] [4] [5]
F4 Management is committed to eliminated product defects and consumer complaints [1] [2] [3] [4] [5]
F5 Management commits itself through CAPEX projects to eliminate quality defects and complaints [1] [2] [3] [4] [5]
Please write any comment you may have about your organisation’s Quality systems in the space below.

Thank you for your time