



**ST. MARY'S UNIVERSITY COLLEGE  
SCHOOL OF GRADUATE STUDIES**

**PRACTICE AND CHALLENGES OF QUALITY  
MANAGEMENT SYSTEM IN CHEWAKA TEA ESTATE**

**BY  
HENOK MESFIN  
SECTION B, ID NO. SGS/0048/2003**

**FEBRUARY 2013  
ADDIS ABABA, ETHIOPIA**

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**A THESIS SUBMITTED TO ST.MARY'S UNIVERSITY COLLEGE,  
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ADDIS ABABA, ETHIOPIA**

**ST. MARY'S UNIVERSITY COLLEGE  
SCHOOL OF GRADUATE STUDIES  
FACULTY OF BUSINESS**

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## DECLARATION

I, the undersigned, declare that this thesis is my original work, prepared under the guidance of Matiwos Ensirmu (PHD) All sources of materials used for the thesis have been duly acknowledged. I further confirm that the thesis has not been submitted either in part or in full to any other higher learning institution for the purpose of earning any degree.

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Name

**St. Mary's University College, Addis Ababa**

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Signature

**February,2013**

## **ENDORSEMENT**

This thesis has been submitted to St. Mary's University College, School of Graduate Studies for examination with my approval as a university advisor.

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Advisor

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Signature

**St. Mary's University College, Addis Ababa**

**February, 2013**

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## **ABSTRACT**

This research work makes an assessment on quality related problems of Chewaka Tea Estate, a company engaged in tea manufacturing and marketing for the last fifteen years. This company produces lower primary percentage of tea against international manufacturing norm and its focus for quality was shattered by the bulk supply of its tea to the local market, but recently the company has been challenged by customers who values quality tea caused by the availability of imported quality tea in the local market which is offered with comparable price.

And hence, this research work has reviewed the practice of the Quality Management System of the company and tried to identify major quality problem areas of the company. A brief introduction on the fundamental concepts of quality with reference to recent literature in the area has been included so as to help readers follow the conclusion and recommendation developed. The research work has also used primary and secondary data for indentify and analyzing quality-related problems of the company using a well structured questionnaire, interviews, personal observations and review of previous research works. Through a thorough assessment of the data and observation of the quality system of the company, the research work found out that the company is far behind meeting and achieving Total Quality Management in its overall operation. The research work has also calculated cost of quality of the company and has found out that the company is incurring loss of huge amount of money due to lower attention for quality.

Finally, the researcher work has identified gaps in six major Total Quality Management elements which the company should give utmost attention to streamline its quality production along with eight steps which can be used as a guideline during TQM implementation process so that the overall performance of the company can be improved both in terms of earning and competitiveness. This study is a qualitative and explorative research work which makes use of a case study focusing on Chewaka Tea Estate, but the finding can be used by other tea estates in the country and also as very few studies conducted in tea sector of the country, this paper can also be used as an input for future research works in the sector.

## **LIST OF ACRONYMS**

**CTE** – Chewaka Tea Estate

**CTC** - Cut - Tear - Curl

**COQ**- Cost of Quality

**ISO**- International Standards Organization

**PQT**- Process Quality Team

**PCDA**-Plan-Do-Check-Act

**QC**-Quality Control

**QIT**- Quality Improvement Team

**QMS**- Quality Management System

**SPC**- Statistical Process Control

**TPS**- Toyota Production System

**TQC**- Total Quality Control

**TQM**- Total Quality Management

**ZD** – Zero Defect



## **TABLE OF CONTENT**

<b>CHAPTER ONE: INTRODUCTION.....</b>	<b>11</b>
1.1 BACKGROUND OF CHEWAKA TEA ESTATE (CTE).....	13
1.2 RESEARCH PROBLEM.....	13
1.3 OBJECTIVE OF THE STUDY.....	16
1.4 SIGNIFICANCE OF THE STUDY.....	16
<b>CHAPTER TWO: LITERATURE REVIEW</b>	
2.1 QUALITY AND CONTRIBUTION OF QUALITY GURUS.....	17
2.2 TOTAL QUALITY MANAGEMENT.....	26
2.3 ELEMENTS OF TQM	
2.3.1 Management and Owner's contribution.....	30
2.3.2 Quality Design.....	33
2.3.3 Quality Improvement.....	34
2.3.4 Quality Control.....	35
2.3.5 Quality Assurance.....	39
2.3.6 Quality Planning.....	39
2.3.7 Quality Auditing and Review.....	40
2.3.8 Other Components	
2.3.8.1 Quality Manual.....	42
2.3.8.2 Cost of Quality.....	46
2.3.8.6 Customer Satisfaction.....	48
2.3.8.7 Supplier Relationship.....	49
2.4 TEA PROCESSING .....	50
2.4.1 Green Leaf Plucking and Transportation.....	52
2.4.2 Withering.....	53
2.4.3 Rotary and CTC.....	53
2.4.4 Fermentation.....	53
2.4.5 Drying.....	54
2.4.6 Sorting and Grading .....	55
2.4.7 Packing and Storage.....	55

**CHAPTER THREE; RESEARCH METHODOLOGY**

3.1 Research Approach .....56  
3.2 Data Collection.....56  
3.3 Sample size and Survey Questionnaire.....57  
3.4 Structural Interview.....59  
3.5 Direct Observation.....59

**CHAPTER FOUR; SURVEY RESULT, ANALYSIS AND ASSESSEMENT OF QMS  
OF CTE**

4.1 SURVEY RESULT AND DATA ANALYSIS.....60  
4.2 ASSESSEMENT OF QMS IN CTE  
    4.2.1 Leadership and Organization..... 63  
    4.2.2 Green Leaf Plucking and transportation.....64  
    4.2.3 Factory Tea Processing.....66  
    4.2.4 Quality Control.....68  
    4.2.5 Education and Training.....70  
    4.2.6 Self Evaluation.....70  
    4.2.7 Cost of Quality.....71  
    4.2.8 Customer Focus.....73

**CHAPTER SIX; SUMMERY, CONCLUSION AND RECOMMENDATIONS**

6.1 SUMMERY .....74  
6.2 CONCLUSION.....75  
6.2 RECOMMENDATIONS.....76

**REFFERENCES.....80**

**APPENDIX A - SURVEY QUESTIONNAIR.....81**

**APPENDIX B - ANSWER OF SURVEY QUESTIONNAIR .....88**

## **LIST OF TABLES**

Table 3.1 Profile of respondents.....	57
Table 4.4.1 Internal Failure Cost of CTE for 2011/12.....	68
Table 4.4 2 Cost of Quality of CTE for 2011/12.....	69

## **LIST OF FIGURES**

Fig. 2. 4.1 Steps included in Black Tea Processing.....	51
Fig. 3. 1 Obstacles to improve quality in CTE.....	59
Fig. 3. 2 Cause of poor quality products in CTE.....	60
Fig. 3. 3 Pareto analysis for quality related problems in CTE.....	61

## **I. INTRODUCTION**

The existence of an organization depends upon its customers and satisfying their requirements must be firm's main aim. And hence for a company to compete effectively leave alone in the global but also in the local market, its products must meet quality and price expectations of its customers. Quality of a product has emerged as the best assurance of customer loyalty, the strongest defense against competition and the only path to sustain growth and earnings over long-term. And also when organizations focus on quality, they benefit from enhanced workers motivation, minimized failures and can minimize production cost. Therefore management of any organizations should recognize and give utmost attention for the quality of its products and should take into account developing and maintaining quality programs to scale up performance integrity throughout the organization (Adedeji B. Badiru and Babatunda J. Ayeni, 1993)

Tea's world consumption is said to be equal to all other manufactured drinks in the world (including coffee, chocolate, soft drinks, and alcohol) put together and now a days the scope of the tea industry in the world wide economic stands at more than three billion dollars a year (Ministry of Agriculture of Ethiopia, 2009) This study has also indicated that more than half of the world population consumes tea and somewhere between 18 and 20 billion cups of tea are drunk daily on our planet. And recently, the scientific community has become interested in the potential health benefits of tea, particularly in those properties that could lower blood pressure and blood cholesterol levels, stabilize blood sugar, prevent tooth decay, and inhibit the growth of cancerous tumors is an evidence of demand increase for quality tea (Tocklai Tea Research Center of India, 2010)

Ethiopia has a total 2,698 hectare area of tea plantation which is found in the three tea plantations located in the southwest part of Ethiopia. Agriceft owns two of the tea plantations namely Wush Wush and Gumero with a total tea area of 2,000 ha and posses 75% of the total tea coverage of the country. Chewaka Tea Estate which is our study subject is the third tea estate and contributes 25% of tea area of the country. These three estates produces a total loose tea volume of 6,200 tons annually, from which they export some 900 tons and the remaining 5,300 tons of loose tea is supplied to the local market (Ministry of Agriculture of Ethiopia, 2009)

As tea drinking culture was very young in our country and price of imported and high quality teas were very expensive, perception of quality tea has been shattered by the lower price of local teas. But, in the last three years the local tea price has increased by three fold and now the price of local and imported tea are much narrowed to the extent that in some packing size they have equal price. On the other hand, the recent economic development achieved in Ethiopia has created quite large number of high class consumers who can afford purchase of imported teas like Lipton from supermarkets and medium shops which are available to the reach of the wider consumer. As imported teas are produced with internationally recognized quality parameters, consumers have started to feel and compare the quality of locally manufactured tea with that of imported ones (Ministry of Trade of Ethiopia, 2011/12)

Tea Experts at the Ministry of Trade and Tea Professionals at Chewaka Tea Estate indicate that;

***The major quality difference of imported and locally manufactured teas are on the availability of primary and secondary grade tea; while the former contains 85-90 percentage of primary and 10 – 15 percentage secondary grade and the latter contains 55 – 70 primary and 30 – 45 percentage secondary grade and the more primary the tea has it also determines the quality of the tea.***

And hence, local tea producers will lose their market share to imported teas and face a challenging situation soon unless these companies strive to meet the quality expectation of their consumers and also production of higher secondary grade tea will lead to inefficient manufacturing system for these companies and this by its own right will force the company to be subject to relatively lower earning.

Therefore, this study assesses the practice of Quality Management System of Chewaka Tea Estate which is the only tea estate established by a private company in Ethiopia and which is engaged in tea manufacturing and marketing for the last fifteen years. The study also tries to identify the challenges of the company on the implementation of QMS and forward recommendation for future consideration.

## **1.1 Background of Chewaka Tea Estate (CTE)**

Chewaka Tea Estate (CTE) is a private company engaged in Tea manufacturing with 160 permanent and 650 casual workers. Chewaka tea estate was established in 1997 with a capital of 39 million birr and is located in the S/N/N/P region of Sheka Zone Masha Woreda some 650 km south west of Addis Ababa. The estate has developed a tea plantation of 541 ha and 210 ha of eucalyptus so far, in addition to relevant infrastructures. The estate has also a modern two line tea processing factory with a designed processing capacity of 3,000 tons of made tea per year. CTE supplies about 80% of its product to the local market and exports the remaining 20% to Dubai, Pakistan, Sudan and Djibouti. The company has a total annual turnover of Birr 50 million from its local and export sales. The company is a major supplier of loose tea for its sister company called East African Agribusiness which has a blending and Packing factory in Dukem which supplies packed tea for the local market. This company has a market share of close to 30% of the local market with its well known brands like Anbessa (Black Lion), Good Morning and Chewaka Premium tea (Chewaka Tea Estate, Strategic Plan, 2009)

## **1.2 Research Problem**

Tea processing starts from hand-picking of top three or two tea leaves and a bud from the plant in the tea estate. The handpicked (plucked) green leaf will be transported to the processing factory which is located in the tea farm the same day and then the leaves are then subjected to several processes in the processing factory including withering, rolling, drying, cutting, sorting and grading. The manufactured loose tea is graded in to either primary or secondary grade based on the quality parameter such as size, fiber, liquor and test of the manufactured tea which also determines the price of the loose tea and usually primary grade fetches 30% more price than secondary grade tea. This loose tea grades are blended with a set ratio by blending and packing factories to enable better infusion, unique test and freshness is maintained and pack tea in to different packing size (100, 80, 50, 40, 4 or 2 gm) to be marketed to family buyers, cafeterias and Hotels (Chewaka Tea Estate, 2008)

The final manufactured tea and the category of grades it will be assigned will result from how effective the company manage the tea processing of the green leaf plucked from the farm and how quality parameters has been maintained in each processing stage. International standard of tea production revile that the proportion of the primary grade tea should be 80 to 90% and that of secondary grade should be 10 to 20% percent (Tocklia Tea Research Center of India, 2010) However, even though the processing machineries are mostly similar with international standard, farming environment is best for tea growing, Chewka Tea Estate has only achieved less than 60% of production of primary grade from its total production which has big impact to the annual earning and profitability of the company (Chewaka Tea Estate, 2009)

As the health effect of tea being felt by consumers worldwide, the demand for tea is increasing from year to year and major loose tea buyer and market leader in supply of family size packed tea like Lipton have also started buying loose tea from Tea Estates in Ethiopia (Ministry of Trade of Ethiopia, 2012) On the other hand due to the increasing conscious of consumers to quality and option of supply of range of variety of tea products the competition in the packed tea market is becoming very stiff. And hence major players of the sector such as Lipton have started forcing their suppliers to obtain different quality certifications such as ISO Standards so that they can supply ISO certified tea to the market. And hence ISO certification is a mandate to sell loose tea to companies like Lipton, which will generate 5-10% premium price for tea with this certification than the ordinary ones (<http://www.liptontea.com>)

The tea processing factories in Ethiopia were able to dominate imported teas mainly due to the very high demand for their products in the local market which were price sensitive and consumers have limited awareness of quality. Since the current tea price in the local market has tripled to what was two year back, the price of imported and locally manufactured teas are getting closer and hence it is now visible that supply deficit is slowly disappearing nowadays as more products are getting into the market. And this phenomenon is gradually building up a competitive market in the country. Competition in the market is forcing manufacturers to look for ways to adapt to this new market condition.

As report from Ministry of Trade for 2011/12 indicate that one kg of loose tea is being sold at Birr 40 and packed tea after value addition being sold for 70 Birr in the local market, however higher quality export tea will be sold for Birr 57 for foreign buyers like Lipton which will pack abroad and sell it back for more than 100 Birr in the local market. And hence, if there is demand for imported tea in the local market, these companies should focus on matching the strategic move by foreign producers like Lipton and utilize their own loose tea to supply packed tea for the local market which will benefit them by providing better earning rather than selling the loose tea abroad.

The government has also started imposing different quality parameters to trade food items in the local market and also it will be much worse to participate in any global trading as there are quality barriers which are set as minimum international requirements. And hence tea manufacturing firms should prepare themselves to compete both in quality and price otherwise they might be engulfed by globalization movement soon. As Chewaka Tea Estate will be directly affected by such challenges and thus studies on Quality Management System development and implementation would be very important for the company.

Therefore the major research questions this study will try to address are;

- Are there any implementation activities of Total Quality Management system in Chewaka Tea Estate?
- Where the company does experienced gaps in implementation of components of Total Quality Management system?
- Does the company know how much it spend on rework and quality related loss?
- Does the company recognize the need for implementation of TQM in its production?
- Where in its operation does the company need more attention in implementing TQM?
- Does the management and the workers view the implementation of TQM will add value to their product in terms of both customer satisfaction and enhance profitability?
- How can the company start implementing TQM?



### **1.3 Objective of the Study**

The general objective of this study is to evaluate Chewaka Tea Estate's quality systems, policies, procedures and activities within the company in line with elements of Quality Management Systems. And further the study will try to achieve the following specific objectives:

- Critically examine and identify the quality associated problems of the factory
- Assess and review on the gap of the company with respect to Quality Tea Processing System
- Assess and review quality system of the company with regards to ISO 9000 system
- Identify the potential areas for improvement
- Propose appropriate measures to improve the quality of the products

### **1.4 Significance of the Study**

This study has been conducted to fulfill the research requirement of MBA program in Saint Marry's University College, however it can also benefit Chewaka Tea Estate by indentifying challenges that necessitate the implementation of quality concepts which will help the company to increase the primary grade production that will increase profitability of the company. As implementation of quality management system is highly related to consumer satisfaction, enhancing employee's motivation and higher productivity, proper implementation of quality management system in the company can also enhance its market presence both in the local and international market.

As the findings of this study can be easily generalized for the other two tea estates in the country, the finding will benefit the existing and future tea growing companies in the country. It can also give a very good picture for enterprises engaged in similarly food processing industries on how to establish practices of Quality Management System and the possible benefits that will be generated through the system. This research can also be used by government bodies like Ethiopian Standard Authority, Ministry of Trade and Ministry of Agriculture to formulate policies and regulation about the sector. And also as little has been research in Ethiopia's tea industry this study can be used as input for future interested researchers.

## II. LITRATURE REVIEW

### 2.1 Quality and Contribution of Quality Gurus

Quality connotes different meaning to different people. Its concept may be easy to grasp but formulating a universal definition is difficult. Several quality authors have defined quality in various ways considering different attributes of a product. Some definitions are listed here under (D. Sarkar, 2000)

- **Juran:** "Fitness for purpose" or " Quality is customer satisfaction."
- **Deming:** "Quality should be aimed at the needs of customer, present and future."
- **Crosby:** "Conformance to requirement"
- **Feigenbaum:** "Total composite product and service characteristics of marketing, engineering, manufacture and maintenance through which the product and service in use will meet the expectations of the customer."
- **Taguchi:** "The loss impart to the society from the time a product is shipped."
- **ISO 9000:2000:** "The degree to which a set of inherent characteristics fulfills requirements."

Others define quality to be the consistency in meeting the user's requirements. When the expected sensory attributes are observed persistently, the item is considered to be of good quality. And when these attributes are missing or non-uniformly/non-consistently exist in the item, it is judged to be of low quality. The quality of a food item can also be evaluated based on its ability to fit the intended purpose, provided that it is supplied at the right time and price (Ezra Tsegaye, 2004)

Quality of a commodity is a composition of attributes that determine its acceptability to the customers. For food items, most attributes are based on the sensory assessment of the product. Usually the selection of a product is narrowed down to one or two important sensory attributes usually common to majority of customers. Food safety is another important attribute and in most instances, it is considered as a basic requirement and is not subjected to negotiation. And hence, Quality is measured in terms of customer satisfaction. The degree of satisfaction depends on the

manufacturer's ability to meet customer's needs and keep on meeting. In a competitive market repeated purchase can be taken as a good indicator of the satisfaction level. With time customers will gain confidence on the product & its manufacturer and attach quality to the brand name (International Trade center UNCTAD/GATT, 1991)

There are a number of food quality characteristics where the measurement technique for each varies. These characteristics are broadly classified into two (International Trade center UNCTAD/GATT, 1991)

**1) Physical characteristics:** - are those characteristics that can be defined and perceived by the human senses. They are also called Qualitative or Sensory Qualities. These characteristics are easier to identify and measure. Physical characteristics can be categorized into three:

- *Appearance Characteristics* include color, size, shape and physical defects;
- *Kinesthetic Characteristics* are texture, viscosity, consistency, finger feel and mouth feel; and *Flavor*
- (*Sensations*) *Characteristics* are the combination of odor and taste. Faced with new product, a person will first make a visual/appearance (i.e. the color, size, shape, etc) assessment of the food, then takes it into his hands and feels the texture of the food and finally checks the aroma and puts it in his mouth and tastes the texture, palatability and flavor of the food.

**2) Hidden characteristics:** - are those characteristics that can't be identified by human sensors and are only revealed through standard chemical or microbiological procedures. This includes nutritional content, chemical composition and food hazards. Chemical or microbiological tests require different instruments/equipment, chemicals, laboratories and well-trained technicians. This makes defining hidden characters more complex and expensive.

There are a number of quality writers who have made immense contribution to the development of quality management concepts, as we know it today. Although there are differences in their philosophies, these quality gurus provided a good base for the identification of the primary elements necessary for the successful implementation of Total Quality Management (TQM). A limited account of their philosophies and contributions has been discussed here below;

## **1. W. Edward Deming**

Deming is regarded as the father of TQM. He is also one of the masters who developed Japanese's success in quality concepts. He emphasized that the management is the key for quality problem in any organization. He assigned 85% of the problems to the system, which directly related to the management and the rest 15% to employees. He argued that management blames workers for things that are beyond their control. Workers, having better understanding about the process, can contribute much for the continuous improvement of the process. The old management style, which limits the employee's role, should be replaced with a management philosophy, which encourages the participations of workers. Deming tried to list some of the obstacles for effective management, which include thinking their problems are different by the management; reliance on quality control department; quality by inspection approach; blaming the workforce; and inadequate testing of new product (Fasika Bete, 2003)

Being the disciple and co-worker of Shewart, Deming has also contributed in the development of statistical process control (SPC). The heart of any quality strategy is SPC, which identifies the special and common causes of variation in products. And these statistical tools are used to communicate quality and encourage quality control efforts throughout the organization. Deming has successfully, implemented the SPC techniques in his native country, USA, and Japan where he received so many awards for his contribution.

Deming has summarized his quality philosophies into 14 steps and these are (Fasika Bete, 2003)

1. Create a constancy of purpose to improve products and services aiming at becoming more competitive to stay in business - through long term planning and constant improvement by means of innovation, research and education, and maintenance of equipment and plan;
2. Adopt the new philosophy - the need for higher quality by promoting constant improvement;
3. Cease dependence on mass inspection but improve process on statistical evidence to achieve quality;
4. End the practice of awarding businesses on the basis of price tag alone - fewer suppliers who understand specification, use of material and other inputs;
5. Improve constantly and forever the system searching continually processes for problems;

6. Institute modern methods of training and education on the job including the management to make the best use of everybody;
7. Adopt and institute modern leadership where managers focus on quality culture;
8. Drive out fear so that people work more effectively;
9. Break down barriers between departments to create a team spirit in tackling problems;
10. Eliminate slogans, exhortation, and numerical goal (targets) and make reasonable requests of the workforce. These only cause adversarial relationships;
11. Eliminate work standards and numerical quotas and focus on quality and providing support;
12. Remove barriers that rob workers of pride in their work like annual rating or merit system;
13. Institute a vigor program of education and training for continual updating and improvement;
14. Work towards accomplishing the transformations given in the 13 points above.

## **2. Joseph M. Juran**

Juran's idea of meeting customer's needs was based on five quality characteristics: Technological (strength); Psychological (beauty); Time oriented (reliability); Contractual (guarantee); and Ethical (sales staff courtesy) (Richardson L. Terry, 1997)

Quality management according to Juran consisted of three basic processes (Juran Trilogy, D. Sarkar, 2000)

- (1) *Quality Planning*: - a process, which identifies the customers, their needs, product/service features, and the process that will deliver all the right attributes and then facilitate this knowledge throughout the organization.
- (2) *Quality control*: - a process where products are examined and evaluated against the original requirements of the customer. And then any corrections needed are made.
- (3) *Quality Improvement*: - a process in which a sustaining mechanism for continuous quality improvement are placed. It involves the establishment of permanent structure to pursue quality and maintain the gains already secured.

He also recommended a project-by-project approach for any improvement process, and the selection of project should be based on their estimated return on investment. Juran was the first to recognize that there are two types of customers in an organization: Internal and external. Internal

customers are those that receive products/service within the organization. External (final, existing) customers are the final consumer of the product/service that is offered by the organization. Internal and external customers are important to the organization and any improvement process must take into account both.

Like Deming, Juran put the cause for any quality problems to management rather than to employees. He also laid out two types of problems, Sporadic and Chronic, and each should be dealt differently. Chronic problems need more of 'breakthrough' principles while sporadic problems need a 'Control' principles. He has elaborated the activities for each.

He has formulated a ten steps quality improvement approach, which are summarized here under (Richardson L. Terry, 1997)

1. Build awareness and conducive environment for change and improvement;
2. Set improvement goals and decide control points;
3. Organize to reach goals - forming diagnostic groups to identify and prioritize goals;
4. Provide training to create understanding of the systematic approach to quality improvement;
5. Carryout problem solving projects - steering council should guide and track the effects;
6. Report progress - diagnostic group should analyze problems, propose solution and report progress;
7. Give recognition - public recognition like certificate & plaques;
8. Communicate results in terms of cost of quality;
9. Keep score of the improvements made;
10. Maintain momentum by making annual improvement efforts as part of the regular systems and process of the company.

### **3. Philip B. Crosby**

Unlike Deming and Juran, Crosby didn't have to go out of the USA to make his impact on quality. By linking quality to cost, he developed a quality message that appealed to the leaders of US corporations. Crosby argued that the optimal investment in quality practices for an organization is zero as it cut re-work costs. This monetary language caught the attention of many US corporations

and was able to pull in the USA into the quality revolution. Crosby defined the cost of quality to be of two types: Cost of Conformance and Cost of non-conformance. Cost of Conformance is the cost of doing it right the first while the Cost of Nonconformance is the cost of doing it wrong and correcting to make it right.

Crosby attributes 80% of quality problems to management and hence building management's capacity through training and education and keeping management's integrity intact is the main ingredient for reducing these problems. The management must also be committed to implement the absolutes of quality and permanently set their minds to quality improvements. Crosby has also developed fourteen steps to quality, which are given below (D.Sarkar, 2000) :-

- 1) Management commitment - management must make clear where it stands on quality;
- 2) Quality improvement team - set up high level and cross-functional team to implement the quality improvement program;
- 3) Quality measurement - to overcome waste in the process, identify the potential nonconformance problem, measure the current status and develop quality program;
- 4) Cost of quality - define the components of quality cost to create awareness of the situation;
- 5) Quality Awareness -it provides a method for raising interest about quality among all workers. The awareness programs can be carried out in two parts: the regular meetings between workers & management and the communication of any quality program and related initiatives;
- 6) Corrective action - a systematic method for solving identified problems;
- 7) Zero defects (ZD) - action a preparatory activities (including the planning) for ZD program launching;
- 8) Supervisors training - for supervisors to carry out their task and responsibility, training is important. The type and extent of training should be defined depending on the situation;
- 9) ZD day - a day for reviewing achievements and making future commitment and understanding quality;
- 10) Goal setting – employees set goals and commit themselves;
- 11) Removal of causes of Error - a communication method between management and employees must be developed for removal of error- causes;

- 12) Recognition of good works of employees in the quality process;
- 13) Quality councils - professional quality staff are meet on for a regular and planned bases;
- 14) Do it over again - emphasize that quality improvement is a continuous and never ending process demanding constant effort. Crosby classified causes of mistakes into two factors: lack of knowledge and lack of attention. Lack of knowledge can be eliminated through education and training while lack of attention can be cured through commitment to excellence and attention to details.

#### **4. Armand V. Feigenbaum**

Feigenbaum argues that quality management covers the full life cycle of the product/service starting from inception, through production and customer service. All functional activities, such as marketing, designing, engineering, purchasing, manufacturing, inspection, shipping, accounting, installation, service, etc are involved and responsible for quality. And for any effective quality control, the integration of these functions is very important. Further coordinating the action of people, machine and information is pertinent. He suggested a system approach to quality. This Feigenbaum's approach has been developed and became to be known as Total Quality Control (TQC). TQC consists four steps, which are setting quality standard; using these standards for appraising and conformance; acting when standards are not met; and preparing plans for the improvement of the standards. Feigenbaum has also listed ten principles to quality which are summarized as follows (D.Sarkar, 2000)

1. Genuine management involvement;
2. Serious consideration of any employee's ideas;
3. Continuity for long-term;
4. Involvement of everybody including factory and office employees;
5. Clear and simple program organization;
6. Initial preparation must be made carefully;
7. Purposeful involvement session;
8. Incorporate fresh and relevant ideas;
9. Line operation leadership;
10. Implementing quality control on company-wide scale.



## 5. David A. Garvin

Garvin identified several approaches to quality, each with different implications for quality control and improvement. These various approaches resulted in multiple definitions of quality, which are a function of purpose, stage of product development, type of product or processes, and company strategy. Garvin has categorized his approaches into five (D. Sarkar, 2000)

- *Transcendental approach* - Quality is defined in terms of innate excellence, which may be attained through learning or experience. Transcendent is a concept taken from Plato's discussion of beauty. It is neither mind nor matter.
- *Product - based approach* - quality is precise, measurable, and can be ranked on various attributes, which are inherent part of the product.
- *User - based approach* - quality is reflected on consumer/demand curves or the ideal combination of attributes for maximizing consumer satisfaction.
- *Manufacturing - based Approach* - quality is conformance to specification, which reduces cost by reducing deviation. It is common among engineers and manufacturers.
- *Value - based Approach* - Quality is performance or conformance to an acceptable cost or the notion of "affordable excellence". The multiple definitions of quality can produce conflicts and communication breakdown. Garvin recommends shift of the quality approach as the product moves from design to manufacturing and to marketplace to avoid any confusion that may arise.

The other major contribution of Garvin is the 'Eight Dimensions of Quality', which he related it with the 'Five Approaches'. These dimensions are (Fasika Bete, 2003)

- *Performance* - refers to the primary operating characteristics. It combines product and user-based approach. The relationship between performance and quality reflects the reaction of customers to objective characteristics.
- *Features* - are secondary characteristics that supplement the basic functioning of product and less central to users. Product - based approach is used.
- *Reliability* - is the probability of a product/service to serve the intended purpose without failure for the intended period of time. It's relevant to durable goods. Product – base approach is also used.

- *Conformance* - is the degree a design and operating characteristics match those specifications that have been laid down. It can be measured in two ways: conformance to specification (Western approach) and degree of variability from the target (Japanese approach). Manufacturing - based approach is used here.
- *Durability* - is the measure of product life. The technical definition is the amount of use before the product deteriorates. Economically, it is the repair cost, or the trade off between repair and replacement due to changing fashions, obsolescence, personal valuations of time and inconveniences and other associated costs.
- *Serviceability* - is the ease with which a defective product is repaired to action. Together with durability it is the most subjectively argued up on dimensions. Most customers consider rapid repair as high quality.
- *Aesthetics* - is personal assessment of product's look, feel, taste, sound or smell and reflecting individual's preferences. User - based approach is used.
- *Perceived Quality* - includes images, brand name, and reputation, which are indirect measures of quality. It gives perception rather than the reality. Here also user-based approaches are used.

## **6. Kaoru Ishikawa**

Ishikawa believes that quality control should be extended beyond the product and include after sales service, quality management, individual's and company's quality perception. Also this control should be company-wide (i.e. TQC). TQC should be every employee's responsibility. Ishikawa has also been associated with the development of the seven quality control tools. The other contribution that Ishikawa made is the introduction of quality circle concept. He argued that neither workers nor managers know the correct solution to a problem. But by working together they would have a better capacity to solve any problem that may arise. This would also enhance the participation of all employees in quality improvement activities. Ishikawa's view of quality can be summarized as follow (Ezra Tsegaye, 2004):

1. Quality Control (QC) is the responsibility of everybody in the company. It is a discipline that combines knowledge with action.

2. Management should put quality at the top of its list, plan for long term benefit and stamp out any sectionalism.
3. TQC management is teams work not an individual act.
4. TQC fails if there is no cooperation among all employees from president to line worker.
5. TQC is a companywide activity and also based on respect for humanity.
6. Middle management will be the focus point in TQC and thus subjected to frequent involvement and criticism.
7. Care should be taken not to confuse objective with means.
8. QC circle activities are part of TQC.

## **7. Genichi Taguchi**

Taguchi approached quality from the engineering aspect. He emphasized the production of goods with a minimum performance variation against the targeted goals or requirements. He called these variations as “noise”. The objective of any quality system is to minimize this noise, which is contrary to the traditional quality management (accept if the specification are met). Taguchi developed the “loss function” where he calculates the loss a product imparts to the society as a function of the distance from the target value of the product. It includes all costs like warranty cost, dissatisfied customers, and performance failure costs. It is given by (Ezra Tsegaye, 2004):

$$L = D^2C$$

L = loss to society,      D = distance from target value,      C = cost of deviation

The loss function relates economics (cost) to variability. Variation from target is waste and cost. It is important to concentrate on reducing the total cost of the process rather than on reducing variation.

## **2.2 Total Quality Management (TQM)**

Total Quality Management (TQM) is management strategy that focuses on producing quality-centric products or services, concentrating on customer needs, striving to provide a data-driven decision process, and a management environment that stresses continuous improvement (Beckford,

2002). Total, as utilized in TQM's title implies that everyone in an organization or enterprise is required to be included and an active participant in the quality improvement process. Quality implies that it is the customers' needs that define the mission of the organization and not simply fulfilling a need in the marketplace. In other words, quality must have a purpose beyond simply building functionally adequate products or providing a basic service to minimum standards. The management component in TQM infers that TQM is an on-going process that is a function within the organization requiring its own resources and oversight of which everyone and each department contributes to. It is important to note that TQM is not a simple managerial task that is culled from textbooks to be used with other managerial techniques but rather, a process that is integrated into the decision-making and performance measuring activities of a company or enterprise. TQM is a managerial style and process not constrained by time or that is completed after simple objectives are met and neither is a project in itself Total Quality Management (TQM), involves the application of quality management principles to all aspects of the business (Ezra Tsegaye, 2004)

John S. Oakland, a famous 'quality' writer also defined TQM as

***TQM is a comprehensive approach to improving competitiveness, effectiveness and flexibility through planning, organizing and understanding each activity and involving each individual at each level. It is useful in all types of organization.***

As Oakland tried to put it, TQM assigns quality to be the responsibility of everybody in all aspects of the organization and in all their activities. TQM involves a continuous improvement of process or product/service seeking that perfect or zero-defect product. It also centers on identifying customer's requirements and surpassing them. TQM also encourages employee's participation and empowerment as employees contribute significantly to any quality related endeavors (John Oakland, 2000)

TQM has its origins in the work of Dr. Deming who had an academic and professional background in statistics. While American corporations were not interested in applying the TQM principles he developed a much more receptive audience in post World War II in Japan where he was recruited among other experts to assist in the rebuilding of Japan. After being exposed to Deming's use of

statistical tools embodied within his TQM concepts, Japan began to apply these principles to its manufacturing and production facilities with great success. The testament to TQM's effectiveness has long been recognized by Japan's rapid rise to its unrivalled status as the world's quality leader with such processes as the Toyota Production System (TPS) and such concepts as Kaizen or long-term incremental improvements ([http://www.asq.org/historyofquality\\_overveiw](http://www.asq.org/historyofquality_overveiw))

During the 1970s, after American companies began to be overtaken by their Japanese counterparts, especially the automotive industry, Americans began applying TQM concepts in order to stay competitive. In the 1980's TQM grew to be very popular and there were great promotion for its implementation in all types of organization. But the enthusiasm dropped down significantly in 1990's. This popularity slum resulted from the controversies that arise from the surveys that have been conducted in the early 1990's. In general, these surveys were more of opinions, perceptions and impressions of different people about the value of TQM. Thus, they didn't present any objective data. As most organizations fail to successfully implement TQM the result of the survey were negative. Furthermore, the response given by organizations that benefited from the implementation of TQM to these allegations were also not based on tangible data. In the late 1990's, different studies based on data collected from organizations, which successfully implemented TQM, verified that TQM indeed pays off and was resorted to its past glory (<http://www.dti.gov.uk/quality/evolution>)

At this stage, managers view quality as an aggressive competitive weapon. They linked quality with profitability as it affects market share and required its inclusion in the strategic planning process. Product liability, foreign competition, pressure from government etc have also forced into existence this strategic approach. While other quality systems have gained prominence in recent years, most notably Six Sigma, they all owe their basic structure to the principles of TQM as first proposed by Dr. Deming. Additionally, many of them, such as Six Sigma, can be viewed as a comprehensive extension of TQM and are all quality management programs. Many might argue that globalization, with its strategic use of quality management strategy and off-shoring, would lead to a breakdown in quality since primary manufacturing and production process are often removed to remote locations.

However, the opposite has been the case. Globalization has led to greater emphasis on quality because its primary factor is the introduction of greater competition on a global scale (Ezra Tsegaye, 2004)

John Oakland (2000) has also identified some of the reasons for adapting TQM in the business companies:

- Customers are becoming sophisticated and knowledgeable and they are demanding more from an organization. If their demands are not met they go to the competitors.
- Nowadays, competitions are getting stiffer and worldwide creating a dynamic environment. Approaches such as TQM are ideal for coping up with rapid changes.
- TQM is the latest approach in managing quality.
- Legislations are becoming tight making organizations more wary about the environment, health and safety. For this, they need heedful, motivated and knowledgeable employees and TQM can help in developing such employees.

John Oakland (2000) has also identified a number of ways to implement TQM in an organization and some of them are indicated here below:

- Direct application of the approaches proposed by the quality gurus;
- Use of models developed from well known quality awards;
- Developing and implementing tailored model for the organization.

### **2.3 Elements of TQM**

A well-established management system for quality will make the implementation effort efficient, effective and company-wide so that the organization will benefit to the maximum. John Oakland (2,000) has defined quality management system (QMS) as, *"An assembly of components, such as the organizational structure, responsibilities, processes and resources for implementing Total Quality Management."* In general QMS identifies seven different components for quality implementation process which are: Manager's and Owner's Contribution to quality, Quality Design, Quality Assurance, Quality Control, Quality Improvement, Quality Planning and Quality

Auditing/review. There is always an interaction among these components and hence the system must take into account this interaction when trying to implement it.

### **2.3.1 Management and Owner's Contributions**

Managers and owners of the company make most of the major decisions and hence make vital contribution to quality. Management concepts ensure that all resources (human, finance, raw material etc) are effectively utilized through planning, organizing, leading, controlling and personnel (Function of Management). As management must focus on the long-term success of the company, management thoughts lately have borrowed quality concepts to ensure competitive edge in the market. And hence management must strive to achieve a better, cheaper, and quicker product. The management must not only demand better quality but also show its commitment through appropriate support and resource allocation (Paul James, 1996)

#### **Leadership**

Attributes such as trustworthiness, integrity and fairness usually encourage people to follow and be committed to the strategies and direction set. But on an organizational level the success of any quality plan depends on the effectiveness of the leadership. Like any manufacturing company, effective leadership facilitates the quality implementation process. Paul James (1996) has identified five main requirements for an effective leadership:

- 1) *Preparing a clearly documented corporate beliefs and objectives:* - Executives must develop a clear vision for the company and the specific objectives for the organization to achieve. The belief and objectives must include definitions of the business; the commitment to effective leadership and quality; target sectors, customer relationships, and market/service position; the role of the organization or units; the distinctive competence of the organization; indication of future direction; the commitment in monitoring performance.
- 2) *Preparing a clear and effective strategy and supporting plans:* - Although senior managers develop strategies and plans, employee's participation must be encouraged to enrich it.
- 3) *Identifying the critical factors & processes:* - Important sub-goal and processes for the successful accomplishment of the mission of the organization are identified at this stage.

- 4) *Reviewing the management structure*: - effective organizational structure with clear definition of responsibility and operational procedure to carry out quality activity.
- 5) *Effective Communication*: - it is vital to have a strong communication line with employees, customers as well as suppliers. Especially employees must be encouraged to make effective participation- mainly through empowerment and involvement.

### **Decision-making**

Decision-making is one important function of the management in which business managers spend a lot of time. It is heavily dependent on the availability and quality of information. Quality management requires decision-making at different level and an appropriate approach for making correct decisions. One such approach is Problem-solving (Scientific) approach (Paul James, 1996)

The first few phases of Scientific method for problem solving provide good steps for decisions making. The method starts by identifying opportunities. This includes identifying the problem, forming a team, and defining the scope. Then comes analyzing the existing situation which includes activities like the development of process diagram, determination of customer satisfaction and measurements needed, data gathering and root cause identification. The main objective here is to understand the process and how it is operating. When trying to understand the process, one must note the process boundaries, the process flow and the relation between outputs & customers as well as inputs & suppliers. Finally, optimal solution is prepared. If more than one solution is proposed, selection can be made based on the result of evaluation and/or testing. The criteria for selection include cost, feasibility, effectiveness, resistance to change, consequences and training requirements. Once a decision is made, it is implemented; results are analyzed; and plans for future action are made. This scientific method can easily be integrated into PDCA quality improvement approach.

### **Organization**

Organizational structures for quality are important in any manufacturing company. The different quality activities are coordinated towards achieving the objective/goals set in the organization. Furthermore proper organization is a pre-requisite for any effectively operating TQM. The type and



width of the structure may vary depending upon the quality target, size of the manufacturing industry, type of product to be processed, skill and educational level of employees available and other factors. At the top are quality managers who over look all activities in the organization. Quality managers must disengage themselves from line activities, and disperse responsibilities throughout the appropriate operating departments. They should help those who control the means for implementing quality in the organization to believe that quality should be an integral part of the organization's activities. Generally, a quality manager needs to be persuader, philosopher, teacher, adviser, facilitator, reporter and motivator.

Although organizations can make adjustments, John Oakland (2,000) has developed the three-tier approach to create organizational structure for quality and each level is discussed below:

- i) *Quality Council*: - It is made up of the top management and chairman of site steering committees or process quality team. The chief executive, who must attend every meeting taking place at least once a month, chairs the council. The council's objective includes providing strategic direction to the organization, preparing plan for each site, setting up and review the process quality teams (PQT) for key business processes, and reviewing and revising quality plan for implementation.
- ii) *The process quality team (PQT) and site steering committees*: - The size of the organization determines whether a team or committee should be set up. All senior managers must be involved in each team who meet monthly. This enables the top management communicate their commitment to quality. The responsibility of these groups are selecting projects for quality improvement teams (QIT), providing an outline and scope for these projects, appointing team leader and members, and monitoring and reviewing the progress and results of these projects. The PQT should be given responsibility and authority so that the team will gain recognition and respect with regard to their process.
- iii) *Quality improvement teams/quality circle*/: - QIT is a group of people with the appropriate knowledge, skills and experience. It is made up of cross functional group and often of multidiscipline setup to solve a single problem on a project basis. They differ from task force in that they involve the entire production operation. Factors that need to be considered before setting up these teams are selection and leadership of the team, objective of the team, team meetings, team dynamics & result and review of the teams. Quality circle was originally

developed in Japan in order to motivate workers and get them involved in the day-to-day activities of organization. They meet (usually weekly) voluntarily and regularly during working hours with their supervisors to identify, analyze and solve problems, and recommend solution to the management. To accomplish their tasks, training is vital for the quality circle. On subjects that need consultation, experts in the particular field must be made available to the group.

### **2.3.2 Quality Design**

Regardless its size, product design determines the long-term survival of any agro processing industry. The main purpose of agro processing is to add value to the product and making it more profitable. Designing is a process where a product and/or its processing methods are planned. For designing (developing) a product either a step-wise or a team-based approach can be used. Even though it is simpler and cheaper, step-wise (sequential) approach is inferior on the design information incorporated compared with that of a team-based approach (John Oakland, 2000) In general, for any successful product development good market and consumer knowledge and retailers involvement are vital. Innovation is one important component of any product designing process. In agro processing company, innovation is a very risky undertaking. It may bring a significant reward or a severe penalty to a company. During designing a balance must be struck between innovation and standard processes. On one side designers may have to use past proven materials and methods to ensure reliability, maintainability and variety control. On the other, they must use innovative and recently developed techniques, materials or components to avoid stagnation of the designing process.

Like any other activities, the designing process must be controlled. But care must be taken not to stifle the creativity of the designers. Design control must be there especially for the cost and time to be within the organization's budget. The designing process must also integrate the activities of the different functions of the organization. Quality design must address all aspects of the customer's needs including, cost, production, safety and ease of consumption. To do so, quality designing must

incorporate activities such as identification of needs, developing product/service that satisfies these needs and finally ensuring that these needs are satisfied in a sustainable way.

### **2.3.3 Quality Improvement**

Quality improvement is all about 'not being satisfied' at the existing state no matter how good it is. There is always a gap for improvement though it may appear to have reached the limit. Quality improvement must have long-term goals and should be embodied into the business strategies. Small improvements made here and there, in time, will lead to a big gain. Quality improvement starts by paving the way for active participation of customers, suppliers (vendors) and employees. Customer satisfaction is the base for any quality improvement activity. Customer's needs must be integrated into the business mission and the overall quality objectives. As these needs are dynamic, there must be a feedback mechanism for coping up with the changes to drive the mission of the business further. Vendor-producer relationship is one component for quality improvement since vendors provide the raw material. A solid relation with suppliers ensures quality material at the right time and amount. Employees make quality improvement a reality. Once the employees are convinced, properly trained and equipped with the right tools, they must be encouraged to be involved in the improvement process. One way of encouraging employee's participation is motivating them. Motivation also enhances the quality of work in an organization. Assigning workers responsibility for design and performance of a task helps quality improvement process in an organization. It will make workers feel more like part of the team rather than an automaton. Obviously, there must be proper controlling mechanism to prevent any abuse. Cutting corners must also be discouraged when it comes to quality (Ezra Tsegaye, 2004)

Consumer Tests are one indicator for measuring consumer's reaction towards a product, which provides a platform for building a quality improvement process. The two common tests are Preference Test and Acceptability Test. Preference Tests are tests conducted to determine a product sample that is preferred by the members of a panel. Acceptance tests are conducted only to determine whether the product is liked or disliked by the panel (International Trade Center UNCTAD/GATT, 1991) In addition to Consumer Tests, experiments can be designed to test any

gap for quality improvement. Once the gap is identified, different Statistical Process Control tools are used to identify and monitor areas for improvement. Some of these tools include Pareto analysis, cause-and-effect diagram and control charts. Finally, process improvement commences using PDCA approach. PDCA (Plan, Do, Check, Act) is an effective technique for quality improvement process implementation, which was developed first by Shewart (Dennis F. Kehoe, 1996) The first step in PDCA is the Planning stage where plans are made using data collected regarding the gap for improvement. The plan identifies problem, defines tools and techniques to be used and revise past cycle's activities. The next is the Do-stage, which involves the actual implementation of the plan. The implementation depends on the type of process implementation strategies selected: Parallel, Phased, Pilot and Direct. Then comes checking whether the implementation are carried out according to the plan. And also problems and other opportunity observed on the previous stage are analyzed. Any condition for continuous implementation, correction and standardization of the plan are finalized in the last stage of the cycle, Act. Then the next and relatively higher stage of PDCA cycle takes on.

#### **2.3.4 Quality Control**

Quality control refers to all activities (processes) and techniques that are used to achieve or maintain the quality of a product or service. It includes finding and eliminating source of defects and monitoring the manufacturing process. The main purpose of quality control is to ensure that the requirements (specifications) of the customers are met when manufacturing the product. Quality control activities are most of the time in-processing activities that are used to guarantee manufacturing specification are met (Ezra Tsegay, 2004)

#### **Defects**

Defect is any form of deviation of the product's characteristic from the specification (standards) set up by the manufacturing process. It can be caused by a single source or the cumulative effect of several factors, which may arise at any stage of the processing. Some of the sources of defects in food processing company includes (International Trade Center UNCTAD/GATT, 1991)

- *Raw materials:* - raw materials may deteriorate in time or becomes process improvement defective by the packaging material or added ingredients.
- *Employees:* - Lack of attention, poor handling or sabotage by employee can easily result in defective products and further more serious risk to human life.
- *Processing Problem* – Defects due to processing include, poor understanding of the processing method, use of inadequate machines, lack of trained staff, machine break down, and inappropriate working environments.

Pursuing the philosophy of prevention of defects is the most suitable approach to quality. It saves organizations from a lot of problems including financial, legislative and consumer's complaints. When a successful defect prevention programs are implemented, a well-established quality control for raw materials, reduction in processing loss and drop in the volume of rejects are clearly observed (International Trade Center UNCTAD/GATT, 1991)

Defect prevention starts with marketing. Thorough investigation of market requirements must include product's position relative to competitors, critical characteristics, consumer's response to the product, shelf life of product, storage requirements and target consumers in terms of age, sex, economic status etc. Based on the information gathered, products and process specification are developed. The specification should identify the quality characteristics of the product, the critical attributes and their measurement, possible defects and its impact on consumers, testing methods and sampling procedures. Specification should also be evaluated against government regulation and compiled into a manual. Based on this manual, the company can formulate its standards for finished products. These standards should consist confirmed information on the requirements; proven products and processing specifications; maintenance of controllable quality characteristics (at a reasonable cost); and measurable implementation procedure for equipments and methods. When adequate defect control is implemented, strict compliance to specification, proper identification and acceptance of raw material and finished products, good relationship with vendors and customers, and effective recording and reporting system can be observed (International Trade Center UNCTAD/GATT, 1991)

### **Quality Control Activities**

All in-coming materials must pass through a series of steps before they are accepted into the processing. A technician will take a sample, inspect and label as soon as the materials are received. Sampling should be done according to the sampling plan prepared beforehand. The container must be tagged with all the necessary information after sampling. Each lot and batch must be recorded into a master ledger. Dispositions are made based on the result of the analyses of the samples taken. The material is retagged in accordance with the decision of the disposition. In the processing stage, quality characteristics are checked against the design of the process. Defective materials at any stage of the process are removed. Sampling and analysis tests are made on the finished product before it is packed, labeled and transferred to the warehouse. Both types of quality attributes (Physical and Hidden) should be properly identified and measured. The measurement of Hidden attributes requires complex equipments and procedures (such as micro-analytical and microbiological tests). Customers usually test food products for its sensory attributes and measurement of this attribute is of paramount importance. Either a jury of people or a set of instruments can be used to conduct sensory tests. There are two types of jury testing: Difference Test & Acceptability Test. Difference Tests are used to identify detectable differences between samples where as Acceptability Tests are used to identify the level of like or dislike for a given product. Sensory attributes can also be measured using instruments such as seed displacement, Penetrometer, Vacuum gauge etc. Chemical and Physico-chemical tests are used to identify attribute such as moisture, fat, protein, carbohydrate, acidity etc (International Trade Center UNCTAD/GATT, 1991)

### **Statistical Process Control (SPC)**

Statistical Process Control (SPC) techniques have proven to be an essential ingredient for success. International Trade Center UNCTAD/GATT, (1991) has identified some of the major uses of SPC in the food industry;

- To help understand variation (both assignable and random) in quality characteristics;
- To help identify assignable causes and set control limits for product specification;
- To determine the quality level of a process through time.

It is important that manufacturers understand and be convinced of the benefits of SPC before any effort is initiated for its implementation. Samples are used when 100% inspections are uneconomical or impossible. Some of the advantages of sampling are low cost, less time, less risk of handling damage, less inspection error, need of fewer staff, and forces organizations prepare quality control plan and take preventive measures. Sample inspection can be based on either Attributes or Variables. In sampling by attribute, items are classified as non-defective or defective according to one or more characteristics. It is carried out using a sampling plan. There are several sampling plans: single, double, and multiple sampling plans. In a single sampling plan samples are taken only once to check the number of defects (for double - twice and multiple - more than two). (International Trade Center UNCTAD/GATT, 1991)

D. Sarka (2,000) has indicated that different Quality Control Tools have been developed and can be implemented in any company. *Cause and Effect diagrams* (Fish-bone diagram or Ishikawa diagram) used to associate multiple possible causes with a single effect. Given a particular effect, the diagram is constructed to identify and organize possible causes for it. *Pareto Chart* is used to identify those factors that have the greatest cumulative effect on the system. This allows the user to focus attention on a few important factors in a process. *Check Sheet* are tools for presenting information in an efficient graphical format. *Histogram* provides the easiest way to evaluate the distribution of data. It is a simple, graphical view of accumulated data, including its dispersion and central tendency. The data obtained from a sample serves as basis for a decision on the population. *Scatter Diagram* is a graphical tool that attempts to depict the information that one variable has on another. *Flow Chart* (Defect Concentration Diagram) is useful in identifying where errors are likely to be found in the system. It is a pictorial representation of a process. *Control Charts* indicates the range of variables that is built into a system. It helps to determine whether or not a process is operating consistently or if a special cause has occurred to change the process. There are many types of control charts for controlling different quality attributes. Each has its own merit and demerits. Control Charts are commonly categorized in to two: those used for Continuous (variable) Data and Discrete (attribute) Data. Continuous Control Chart includes X-R charts used for average and ranges and X charts used for average measured value. Discrete Control Charts are P, Pn, C, &

U charts used for fraction defectives, number of defective units, number of defects and number of defects/unit respectively.

### **2.3.5 Quality Assurance**

Quality assurance involves prevention of quality problems through planning and systematic action. It takes a wider view than quality control. Quality should not be about fixing a problem but preventing it. Quality assurance, therefore, includes the whole production and distribution system starting from the supply of raw materials through the internal management to the customer. Quality assurance system must be documented to clearly show who is responsible for doing what and when. Employees must be motivated and well trained to carry out the quality assurance activities. A two-way communication must also be there to facilitate the quality effort in the organization. Quality assurance system need not be complex and should be continuously improved and refined (Ezra Tsegaye, 2004)

### **2.3.6 Quality Planning**

For an effective quality management system planning is a basic requirement. John Oakland (2000) has defined quality plan as: "*Quality plan is a document which is specific to each product, activity or service or group that sets out the necessary quality related activities*" Conduct a hazard analysis Quality plan must start by setting 'Zero Defect' through continuous improvement as its objective. Planning facilitates decision-making and enables the organization to be proactive where future problems are anticipated and the necessary actions are taken in advance. Continuous review of the plan is an important activity in developing more suitable plan to the current situation. A preliminary analysis of the aspired quality level, the existing organizational structure and the available resource in order to carry out the assignment must be made. Reviewing the existing program in an organization is important in any quality planning. And comparing this review with the preliminary analysis gives a base for appraisal of the strength and weakness of the quality system in the organization. This helps in defining the required systems and programs in terms of detailed operating plans, procedures and techniques.



Quality management system should start by establishing quality polices and objects (goal). Then comes creating the organizational structures and defining responsibility. After establishing quality system, problem areas are identified to prepare improvement programs. The programs developed are then implemented and their progresses are monitored regularly. The system's effectiveness is finally evaluated through auditing and reviews and adjustments are made to the quality system and the rest of the steps are carried out again, Quality plan should avoid wastage of cash and if this is not the case, the plan should be revised. The plan has to be prepared in such a way that it will function irrespective of management or personnel change. In general, quality management system must be planned and developed taking into account all function such as design, development, production/operation, subcontracting, installation, maintenance and so on. The plan should include purchase material/service specifications, procedures for quality system, product formulation, service type, specification for packaging and distribution, procedures for sampling and inspection, and process control (John Oakland, 2000)

### **2.3.7 Quality Auditing and Review**

Quality reviews are systematic and periodical activities carried out to check whether the system achieved the required effect. And quality auditing is an official examination of the functions in an organization against a standard or document. Review must use audit findings and ultimately lead to system improvement (Ezra Tsegaye, 2004) Quality management system review must be conducted at least once a year on all levels. It should show any defect or potential danger in the system and indicate possible corrective action.

Quality audits are made to gather objective and factual information for specific purpose. It can be conducted by anybody including the management and customers. Quality audits can be made to test the level of conformance to a system (compliance auditing), review the effectiveness of a system or meet legislative requirement to make one (mandatory audits). There are different types of quality audits including product audit, supplier assessment/audit and performance audit. It can also be categorized as internal or external auditing and first, second or third party auditing. *Internal Auditing* is where organizations audits itself or employ other qualified auditing body to make the

audit. Here the client/audited is the organization and the auditing body can be itself or a sub-contracted party. When the organization audits itself, it is called First Party Auditing and when a subcontracted body is used, it is called Second Party Auditing. In the first party auditing the auditing body can be drawn from either the area to be audited (True Internal Auditing) or from other sections of the organization for obtaining fresh another organization requests the auditing of an organization, it is called *External Auditing*. Here, the client is the organization initiating/requesting the auditing, the auditee is the organization being audited, and the auditing body is the one carrying out the auditing. When an external auditing is made by a subcontracted organization, it is called a Third Party Auditing.

Before beginning any quality auditing, the scope of the audit has to be defined. This is important because of resource constraints. Simply, one can't have the resources (budget, time, manpower, skill, and facility) to audit everything in the organization. Therefore, boundaries have to be set for the audit. The objective of an audit is the first boundary. The objectives determine what information is needed or the reasons for making the audit. The next is to define the system or element of the system to be reviewed and decide against what measures that the quality audit is going to be compared with. Then comes enumerating the areas, functions and operations of the organization that are going to be audited. This should cover location of each function. Finally resource requirements have to be prepared including budget, time, manpower & skill needed and any special requirements for the audit.

Looking at the overall auditing process, the planning is the first activity in line. The content of plan should include audit type, objective, scope, audit language, members of the audit team, representatives of the client, documents (information) required, audit areas, functions of the organization to be audited, timetable, resources and facilities required, method of communication and problem resolution methods. Preparing this plan should involve the client, audit team and auditee. Once the plan is prepared, gathering and analyzing data using different working methods commences. Check lists and different working documents can be used to guide the auditing activities. In-process reporting can be used to communicate between the audit team and auditee. But final findings are reported using standard formats and depending on the agreement with the client,

proposal for corrective action can also be included. There should be proper presentation (verbal or otherwise), documentation and record for any future reference.

The activities of quality auditing can be classified into two: those that are performed by the head of the audit team and those by all members of the team. The head auditor starts the auditing activity by selecting the team members for the auditing team and focal person in the organization to be audited. This is the preparation phase. He has to make sure that the members understand the objective and standards for the auditing. The next phase, the data collection, is the most common and visible activity. All auditors have to collect data by means of interviews, examination of documents, interrogation of data records and other means. In addition to these, the head auditor has to manage the day to-day activity. Then the initial review phase follows where the data collected are reviewed and analyzed starting the process of identifying nonconformities and conformities. But the main purpose, at this stage is to show the real picture of the organization. Auditors have to support their arguments with facts (evidence). Finally, the reporting phase where the head auditor takes the responsibility of deciding the content and issue of the audit report. But the team has to agree on the draft of the report.

The size of the auditing team may vary from a single individual to a number of people depending on the type and scope of the audit. Although solo auditing is possible, it is advantageous to audit in pairs. But increasing the auditing team more than two members will have a diminishing return. The team could be made-up of lead auditor, auditors, trainee auditors, experts, and observers. It is also pertinent to consider the qualifications of the auditors including education, training, auditing skill, technical skill, work-experience, language skill and auditing experience. Also the human nature of the auditor like fairness, honesty, awareness, sensitivity, tenacity, behavior under pressure, and analysis and decision making capacity are vital for making a successful auditing.

### **2.3.8 Others Components**

#### **2.3.8.1 Quality Manual**

Quality management manual is a document consisting of the general quality policies, procedures and practices of an organization. It may be difficult and inconvenient to prepare a comprehensive

manual, which presents all activities for large organizations. In such cases, only the location and contents of other manuals detailing the procedures and practices for specific areas can be given in the quality management manual. Most companies fear preparing and documenting their product design and specification. Because in doing so, they feel that they would reveal their business secrets. Keeping secrets must not be at the expense quality. Quality management manual (also referred as Quality Manual) can be divided into three parts: namely Quality Policy Manual, Quality Procedure Manual and Work Instruction (Jenny Waller, Derek Allen & Andrew Burns, 1993)

In theory, quality management manuals should be written after all decision-making, resource allocation, policy formulation and agreement on procedure are complete (Jenny Waller et.al., 1993) Thus, making quality manual writing just a matter of structuring and recording of decisions. But in reality, manuals and management system are prepared simultaneously. That means writing down when each decision is made and revisiting and revising them as it becomes necessary. The structure of the quality manual ensures no part is missed in the development of the management system. Good quality manual design helps users to easily find read and understand, information from the manual. The design starts with the format and binding of the manual. It is common to use ring binders for the manual, as it is cheaper and easy to make changes or photocopy. Access features such as covers, content lists, section starts, heading, running heads, page numbers and indexes must be carefully designed since these parts are most often read. Design techniques for organizing information, making the information legible, and laying out pages, tables and diagrams should be used in the quality manual's preparation.

### **Quality Policy Manual**

A quality policy manual identifies the primary functions of the organization and how these functions are managed and controlled. It consists of six main components including (Jenny Waller et. Al, 1993)

- a) *Introduction*: - covering what quality management standards are used, how the quality manual is organized and controlled and the people who are implementing it.
- b) *Policy statement*: - includes quality mission and policy statement of the organization and the signature of Chief Executive Officer at the end of the policy statement.

- c) *Organizational structure*: -description of organizational structure, usually using charts.
- d) *Management responsibility and authority*: -gives the responsibilities and reporting relationship for all functions in the organizational structures.
- e) *Management review*: -it is a regular evaluation of all aspects of the quality management system and includes who leads it, how often it's held, what the objectives are, what information source will be used and how the findings are presented.
- f) *The Quality Management System and its conformance with ISO 9000 requirements* (any other standards): - covers the scope of the QMS and its conformance with the ISO 9000 requirements using charts, list, or separate sections to show.

### **Quality Procedure Manual**

Quality procedure manual deals with tactical aspects of the quality management system. It defines the practices and operational details of the organization (Jenny Waller et. al., 1993) Quality Procedure Manual must

- a) Define the quality management processes;
- b) Describe the procedures for smooth and uniform process work.

Quality procedure manual must be styled to suit middle managers who use it frequently. Procedures are vital for successful implementation of the quality management system and therefore must carefully be prepared. Management processes such as sales and marketing, accounting and finance, and quality assurance are common to all organization and hence easily adopted. But processes such as operations management, infrastructure management and project management are specific to an organization and need to be prepared locally. Quality management processes start by identifying who the customers are, what the products/service are and what functions exist in the organization. Standards such as that of ISO 9000 provide guidance and models for management processes. Once the processes are defined, proper presentation is important in order to communicate it with users (usually using listing or diagrams).

In the preparation of the procedure manual, writing down the procedures succeeds the management process identification. The procedure manual should give information on (Jenny Waller et.al. 1993)

- a) How the management processes are carried out;
- b) Who will carry out these processes using job title to describe them?

- c) How these processes are documented;
- d) Which work instructions are going to be needed?

Good procedure preparation takes time and effort. It should also be tested before its submission as a final version.

### **Work Instructions**

Work instructions have other names such as workplace instruction, third level documentation and support documentation. It is a material that employees refer to perform their day-to-day activities properly. It is also a large quantity document, which includes forms, technical manuals, drawings, instructions and standard methodologies for testing reference and research materials. Workplace references play an important role in an organization's quality system. Since employees constantly refer these materials, they directly influence the way employees do their jobs. They are also used as a base line for any quality improvement process undertaken by an organization.

### **Quality Standards**

Quality Standards are fundamental for any quality management system to function properly. Quality standards are frameworks for achieving a recognized level of quality within an organization. Achievement of a quality standard demonstrates that an organization has met the requirements laid out by a certifying body. There are at least four different sources of product standards: company standards, industry standards, national standards, and international standards (<http://www.iso.org/iso/en/aboutiso/introduction>) Quality manual can be considered as company standards where as the national standard are governing rules to manufacture and trade the product in the specific country

International standards are increasingly important for doing business in a global environment. International Standard Organization (ISO) has developed a set of standards for quality systems that is required for quality certification. The ISO 9000 family of standards represents an international consensus on good management practice. Its primary aim is to give organizations guidelines on what constitutes an effective quality management system, which in turn can serve as a framework for continuous improvement. ISO 9000 is not a product quality label or guarantee by itself however

compliance with the standards verifies product repeatability such that products produced under a specified standard will have similar dimensions of quality.

### **2.3.8.2 Cost of Quality**

The first questions that managers raise when considering implementing quality improvement activities are the cost of these activities and their returns. If closely assessed, it is observed that the investments on the quality improvement activities are returned through the reduction in operating cost. That is why Crosby argued that 'Quality is Free'. There are two approaches for collecting and presenting cost of quality: Prevention, Appraisal and Failure (PAF) costing & Process Cost Modeling (Dennis F Kehoe, 1996)

Prevention cost is the costs producing defect free products. These costs include cost of developing a product design and specifications, preparing and maintaining purchasing procedures, setting up quality planning and administration structure, training, and carrying out a quality audit. Appraisal cost is the cost of all those processes that assure quality is part of the product. It includes process testing, preventive maintenance, supplier's assessment and finished products testing. Cost of Failure can be classified in two: Internal and External. Internal Failure Costs are costs incurred when products fail to meet specification or quality requirements while they are in the organization's premises. Some examples are non-crisp potato chips, fermentation tasting canned mango, pulp and bulging cans and other packaging and processing defect. External failure costs are costs that arise due to failure of the product after it has left the organization.

The PAF approach has a number of drawbacks. In reality, everything that a well-managed organization does can be considered as prevention. And separating preventive activities from other activities becomes difficult. It is also difficult and in some case not necessary to classify costs into these categories. Investing in the prevention activities decreases the total cost to a certain optimum point and any further investment will actually increase the total cost. The PAF approach doesn't consider this fact, which seriously handicaps the quality costing process. Thus, the process cost modeling is more preferred. The process cost modeling approach classifies the cost of quality into

two: the Cost of Conformance and the Cost of Non-Conformance. Cost of Conformance is the cost of producing an item exactly to the requirements, the first time and every time. It is approximated by sum of the cost of prevention and appraisal. Cost of Non-conformance is the cost of failing to produce to the requirements or variable products. It is more or less similar to the cost of failure. The sum of these two costs gives the Total Cost of Quality.

Appraisal costs activities should be minimized, as they are non-value adding. They are defined as non-value adding as they do not change the quality of the tea. The more inspectors or verifications conducted the less likely poor quality will be shipped to the customer; however these activities do not prevent the poor quality from being produced. By spending more money on prevention activities, appraisal activities can be reduced and this leads to lower failure costs.

With reference to CTE, the COQ are classified into four as shown here below;

**Prevention Cost:** The costs of all activities specifically designed to prevent production of poor quality tea or associated processes.

**Appraisal Costs:** The costs associated with measuring, evaluating the tea produced or auditing the factory to assure conformance to quality standards and performance requirements.

**Internal Failure Costs:** Failure costs that arise before the company supplies its product to the customer i.e. prior to delivery or shipment of the product. These are due to deficiencies discovered before delivery and are associated with the failure (non- conformance) to meet the needs of customers. As the product tested and graded at the buyer warehouse, and if it is found to be lower grade it will be rejected or downgraded, there is external failure cost associated. However, if internal quality failures of defective product are identified before shipping then optimistically there may be no external failure costs.

**External Failure Costs:** These are typically due to errors found by customers. Failure costs arise after the tea is supplied to the customer. These might happen in two cases; one if the buyer test and down grade primary tea to be secondary grade and the second totally discard the tea due



to damage during shipment due to packaging or adulteration of any foreign matter found mixed with the tea with substantial amount. The buyer pays lower price for the first and totally discards and pays no money for the second type.

### **2.3.8.3 Customer Satisfaction**

A customer is anyone who receives and uses what an organization or individual offers. As discussed above, there are two types of customers: Internal and External. If an organization wants stay successful in the market, the satisfaction of both types of customers is equally important.

Customer satisfaction level may vary on the type requirement (Basic, Performance and Delight) met by the product (D. Sarkar, 2000) The involvement must be from the product design to the final delivery and consumption of the product. In consumer products external customers are not only final consumers but also retailer. Retailers assume some risk in the distribution of the final product. They also have first hand information about consumer's quality characteristics requirements, food research institutes and government regulatory bodies must also be consider as customer. Thus, broader view must taken when inputs from customers is involved. In any food processing industry, there must be a positive working environment. Food products are especially susceptible to any sabotage and product spoilage. Therefore, employee's satisfaction in the work condition is crucial. This is achieved through employee's involvement and empowerment. Once employees are adequately trained, involved and empowered in the manufacturing processes and acknowledged for their effort, they start to see their organization in a positive prospect. The main objective here is to create a feeling of ownership by the employees. To this effect, different method can be used including providing financial interest, ensuring job security, creating suitable organizational structure, and implementing different

### **2.3.8.4 Supplier's Relationships**

Raw materials and parts purchased can become a source for quality problem in an organization. Quality management employed by suppliers is, therefore, very important for an organization. Traditionally, customer-supplier relationships were adversarial in nature where one is suspicious of the other. There was minimum flow of information and cooperation towards achieving a common

goal. Modern approaches of quality condone such relations as suppliers proved to be a very important component for any total quality improvement activities. A relationship of trust and partnership may not be developed overnight and requires major behavioral and attitude change from both parties. As most of the quality gurus concur, the criteria for purchasing materials should not only be prices but also other aspects of quality. For any poor quality purchase the organization will incur extra cost.

Food production and supply consists of a value adding chain starting from the farm right up to the consumer. The quality of food items can easily deteriorate at any stage of the chain. Therefore, to deliver quality to the final consumer each member in chain is equally important must be given equal attention (International Trade Center UNCTAD/GATT, 1991) There must be a properly outlined manual for the purchasing of raw materials. It must clearly define

1. The responsibilities of different parties with in the purchasing function.
2. The manner in which suppliers are selected, to ensure continual supply of raw materials.
3. The requirement for purchasing activities such as written orders, specifications, etc. which preferably in document form.

Suppliers of raw materials are expected to meet some basic requirement which include consistent (low variability) products, meeting targeted requirements, implementation of process evaluation and development, reduction of variability continuously, correct delivery performance, the right speed of response and an appropriate QMS (Ezra Tsegaye, 2004)

Many organizations, especially in the manufacturing company, have adopted an inspection oriented quality system for incoming materials. This kind of approach has a number of disadvantages. It is expensive, imprecise and impossible to apply equally to all material that is brought in. And all these will lead to variability in the cost as well as quality of the end product. Hence, teaming up with suppliers is the best solution for these problems.

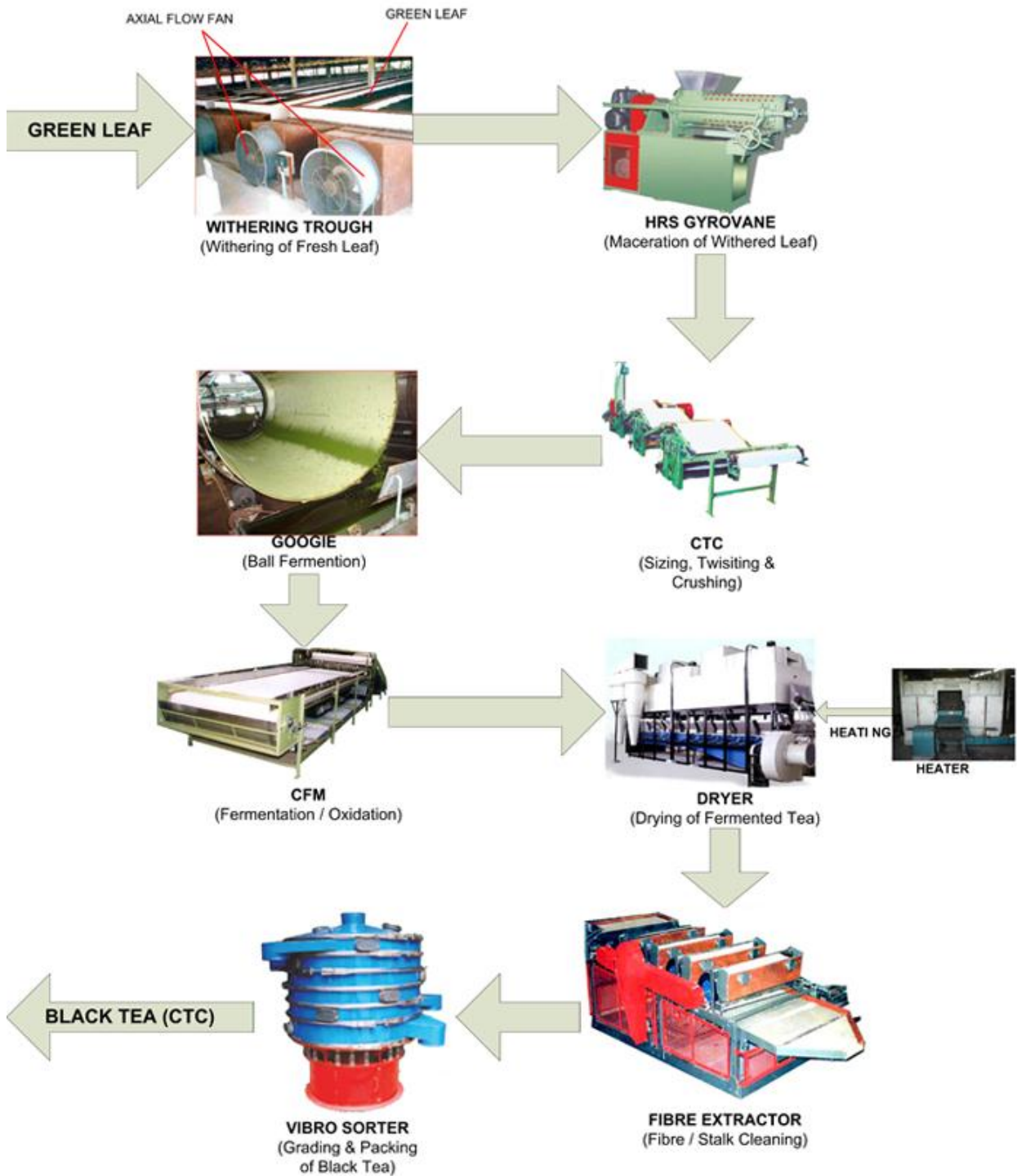
## 2.4 TEA PROCESSING

There are major four different types of tea processing; these are white tea processing, green tea processing, Orthodox tea processing and Black CTC tea processing. But the common one in Ethiopia is Black CTC Tea which unlike others the oxidation is more intense and the green leaf passes through different types of processing (Chewaka Tea Estate, 2008)

Tea production process starts from plucking and receiving of green leaves to the factory and passes through different process to get desirable made tea quality. The process includes receiving of raw material (green leaf), withering, conditioning the leaves, crushing, tearing, curling, fermentation (oxidation), drying, sorting and grading (Chewaka Tea Estate, 2008)

The chemical found in tea are the major contributors for the appearance and quality of the tea which is mainly affected by the processing of the green leaf to made tea. The chemical present in tea has significant effect as anti ulcer, anti diabetic, anti cholesterol and anti cancer. And both organic and inorganic chemicals are found in tea and Polyphenols, gallic acid, catechins etc are included in the organic components of tea, whereas K, Ca, Mg, Fe, etc are included in the inorganic contents of tea. Sugar and starch are also constituents found in tea but only in small quantity and hence the tea processing involved in tea enables the tea to acquire the above chemical characteristics (Tocklia Tea Research Center of India, 2009)

Figure 2.4. 1 STEPS INCLUDED IN BLACK TEA PROCESSING



#### **2.4.1 Green Leaf Plucking and Transportation**

Tea processing start from the tea bush when a tea leaf being plucked. The tea bush is a perennial tree capable of growing to a height of 10 meters. It is therefore necessary to manipulate the tea bush height so as to maintain the table within the reach of manual or mechanical pluckers. The plucking surface height varies from 50 cms to 110 cms and is maintained within this range by regular green leaf plucking, pruning, tipping and breaking back. Plucking is referred to as either FINE or COARSE. The two terms are directly controlled by the plucking interval (Plucking round length), and refers to the size and texture of the shoot being harvested. Shorter plucking intervals (twelve to fifteen days) promote fine plucking as the shoots are being removed when still very succulent. Apart from ensuring high quality tea (more primary grade) being made from the soft shoots, the faster regeneration of shoots results in maximum harvests per year and therefore maximum yield (Chewaka Tea Estate, 2008)

Coarse plucking on the other hand means harvesting of shoots when they are longer, with enhanced fiber content and lower grade (more secondary grade) This is associated with longer plucking rounds (more than twenty days), and normally results in more damage on the tea bush due to plucking being done on harder, more mature parts of the bush. Recovery and regeneration of fresh shoots is normally slower due to the damage on the bush, leading to further longer rounds which results in fewer harvests during the year and therefore lower yield from the fields (Chewaka Tea Estate, 2008)

Leaf handling, leaf quality preservation and transportation to the factory constitute a critical chain in the process of plucked green leaf and turning it into acceptable quality black tea. The processes of withering and fermentation start as soon as the leaf is plucked, and therefore it becomes critically important that the leaf is delivered to the factory as soon as it is plucked for these processes to be appropriately controlled. It is also a requirement of black tea quality manufacture that the leaf should arrive in the factory with minimum damage, bruising etc. In other words, the texture of the leaf should be preserved without any rupture and with good aeration that will set off the process of oxidation (Tocklia Tea Research Center of India, 2009)

## **2.4.2 Withering**

WITHERING is the first and foremost step involved in tea manufacturing and its primary aims is to reduce the moisture content of the leaf and to soften it. The tea leaves are spread out on a large tray of wire mesh (withering trough) and hot air blowers are used to heat the leaf and drive the moisture out. The evaporation of moisture in the green leaf is brought about by blowing or moving air over the leaf in the withering trough. To attain good withering two systems are employed i.e natural and artificial withering the former entails use of withering fans alone to aid moisture removal whereas the latter involves use of heated air from steam generated by the boilers. The current of air performs two functions, conveying heat from the leaf as well as carrying away the water vapor through a bed of green leaves to achieve physical withering. Withering duration is dependent on temperature and humidity and could range from 18 to 24 hours. During withering the green leaf undergoes physical change by losing about 30% of its moisture and increased flaccidity of the leaf. The green leaf also undertake desirable biochemical changes from plucking to initiation of processing (manufacturing) (Tocklia Tea Research Center of India, 2009)

## **2.4.3 Rotorvane and CTC (Rolling)**

After withering teas are moved to the process of rolling. Withered leaves are subjected to rolling machine under pressure twisting the leaves, rupturing the cells & releasing the natural juices promoting oxidization of the polyphenols in the presence of oxygen from air. Here two separate machines are used namely Rotervan and CTC Machines. The purpose of the rotor vane is to condition the leaf before maceration by the CTC. The CTC's are meant to achieve cutting, tearing and curling of tea particles. This disruption of the cell structure ensures mixing of polyphenols and the enzyme and exposes the contents to ambient air (Tocklia Tea Research Center of India, 2009)

## **2.4.4 Fermentation**

After the rolling process of tea leaves, tea leaves are forwarded to the fermentation process to produce different kinds of tea colors such as non-fermented, light-fermented, medium-fermented and fully-fermented. Fermentation starts immediately after cell rupture. The machine being used

here is called continuous fermentation machine, which has a rolling bed subject to blowing of cold air beneath it using large fans.

Fermentation is the process of oxidation of leaves during which the Polyphenols in the tea leaf are oxidized in presence of the enzymes and subsequently condensed to form Colored compounds contributing to the quality attributes of tea. The objective of fermentation is to undertake chemical changes of tea that will lead to increase the taste of tea. The result of chemical process involve in fermenting process is getting the taste, smell & color of the final tea. And hence the fermentation process involves spreading out of the leaves macerated by rolling to a fermentation bed with a layer 5-8 cm thick for 45 minutes to 3 hours, depending on the quality of the leaves, temperature and humidity.

In fermentation process, cold/humid and cold/dry air conditions are ideal for hot and cold ambient conditions respectively. Short fermentation time and low fermentation temperature favor formation of more theaflavins which are responsible for brightness, color and briskness. The opposite i.e. high temperature and long fermentation time favour formation of thearubigins which are responsible for cup body (total color) and soft taste. A balance of the two must be achieved to get a whole some quality cup. Fermentation time, temperature profile, air control and relative humidity determine the cup characteristics and the quality of the tea (Tocklia Tea Research Center of India, 2009)

### **2.4.5 Drying**

Drying is the processes during which the enzyme activities are stopped & moisture content is brought down to 2% - 3%. After fermenting teas are moved through a conveyer belt to the process of drying. The stem being transported to the drier passes through three chambers above which the tea fluidize and the tea continuously move to the end for an average of thirty to forty five minutes.

The machine used for this purpose is called Fluid Bed Drier. The drier uses steam generated by a boiler which boils water using Firewood (eucalyptus) and supply hot air (steam) to the drier. The drier has three chambers where the tea passes and the inlet temperature of steam, medium and outlet of temperature which are 140, 120, 35 degree centigrade are the determinant factors in drying the tea to be manufactured within acceptable quality. Proper drier firing temperature must be maintained to enhance the bloom i.e. undisturbed outer coat on tea particles. When teas are under

fired, they will appear brown with under fired smell and taste. Optimum firing is ideal at the right temperature to arrest fermentation and play a role in conversion chlorophyll to pheophitine and phyophobide responsible for black and brown color respectively (Tocklia Tea Research Center of India, 2009)

### **2.4.6 Sorting & Grading**

Sorting is the operation in which particles of bulk teas are separated into various grades of different sizes conforming to the grade requirements. Sorting is basically separation of fiber (secondary grades) from black tea (primary grades). The machinery used is a fiber extractor that has a p.v.c. drum rubbing against a woolen pad thereby creating an electrostatic force. This force is able to pick light tea particles which in this case are the fibers. The heavier particles which are less charged pass beneath and are the black primary tea.

Grading is the classification of tea particles depending on their sizes. The machine being used here is called Vibro Sorter which have meshes with different sizes i.e. mesh no14-for BPI,N.24-for PF1,mesh No.30 for PD, mesh No. 40 for D1 where all constituents of primary grade and mesh NO.60 for fluff or Dust. On top of this, the gauge of the wire in the mesh is important and contributes to the appearance and the percentage of the various grades produced. The setting of the final sorter i.e. the angle of rotation determines the effectiveness and the results of the final sorter. Clogging and overfeeding has the effect of mixing grades and as such regular cleaning and feed control are important (Tocklia Tea Research Center of India, 2009)

### **2.3.7 Packaging & Storage**

Packing is done to preserve the product and to enable it reach the consumer in a safe manner. As tea is hygroscopic material its packaging and storage also plays very critical role in the quality of the final product. And hence manufactured tea are kept in food grade storage bins for two purposes; one to preserve the tea from foreign matter and second in order to bulk teas during packaging so that its evenness will be maintained. There are two types of packing used during packaging one is a metalized paper which is normally used for packing of high quality tea and also PP bag with plastic inner line for packing of secondary grade (Tocklia Tea Research Center of India, 2009)



## **III. RESEARCH METHODOLOGY**

### **3.1 Research Approach**

This study employs qualitative research approach in the data collection and analysis for explaining the challenges and practices of the Total Quality Management of Chewaka Tea Estate, which is our case study. According to Kumar (2008), Qualitative research is a method of inquiry applied in several academic fields; and it is concerned with qualitative phenomena i.e. phenomena related to or involving quality or kind. And also explanatory research is the type of research which focuses on studying a situation or a problem in order to explain the cause and effect relationship between given variables. This type of research aims at discovering the underlying motives and desire, using the in-depth interviews for the purpose. And hence, the qualitative approach affords the researcher the opportunity to make deductive assumptions that are clearly based on the facts produced during the research and also because of the explanatory nature of this research; a case study approach is a suitable methodology. Thus, the conclusions and recommendations that arise from this research are both grounded in the literature as well as on practice.

### **3.2 Data Collection**

Data has been collected from both primary and secondary sources. Data from primary sources was collected using interviews supported by questionnaires from key informants and operators within the company. The primary data collected is employed to support the observations gained from the existing literature as they apply to Chewaka Tea Estate as well as to produce and support recommendations that culminate at the conclusion of this research project. Information from secondary sources has emanated from published and unpublished books, scholarly journals and internet search engines. The firm's financial reports, organogram, Strategic plans and Annual Performance report are also used as part of the secondary sources. In order to obtain important information about the sector, the following organizations were also contacted;

- Ministry of Agriculture; a benchmarking document on tea sector of Ethiopia, 2009
- Ministry of Trade; sector review of the local tea trade for 2011/12
- Central Statistics Agency; price index of tea for 2010/11

### 3.3 Sample size and Survey Questionnaire

A sample size of 80 individuals (which is 50% of the total population) have been selected out of a total 160 permanent and contract workers of the company. The sample size was decided after considering the expected response rate which was estimated to be 60%, requirements for performing statistical analysis, available time and survey cost. Moreover, all of the seven management members who have Degree and above, all of the fifteen middle management who have a qualification of twelve complete (3), Diploma (7) and Degree (5) and also to increase comprehensiveness of the study randomly selected fifty seven line workers whose educational background are ranging from eighth to twelve grade are included in this survey.

And hence from a total of 80 questionnaires distributed, 43 questionnaires which has almost 55% response rate were completed by the respondents. All of the management members, twelve of the middle managements and twenty four of the line workers has responded back to the questionnaire. The most common reasons for non-response were suspicion of workers on independency of the research and low educational level of line workers and unwillingness by the middle management.

Table 3.1 Profile of respondents

Description	Management	Middle Management	Line workers	Total
Total Number of workers in the company	7	15	138	160
Total Questionnaire Distributed	7	15	58	80
Total Returned Questionnaire	7	12	24	43
Response Rate	100	80	41	55
Educational Background workers in the company				
Above BA/BSC Degree	7	5		12
Diploma		7	8	15
Eight to Twelve grade		3	130	133

The type of questionnaire used to collect data is structured in a way to capture both the middle management and lower workers and hence two set of questioner has been prepared by adapting from a research work conducted by Esra Tsegaye (2004). The first one was in English and has targeted middle and higher management staffs and the second one which is Amharic distributed for line and lower workers where both questionnaires presented in Appendix A.

The first category of the questionnaire contains 58 questions requiring four types of answers:

- The first type uses a nominal scale, Yes or No
- The second type uses an ordinal scale, Excellent, Very Good, Good, Fair, Poor
- The third type of scale is Very high, High, Moderate, Low and Nil
- The fourth type requires brief answer for subjective questions

The questionnaire in this survey is categorized into five different sections with reference to the tea company. The first category of questions (1to7) was designed to explore the general quality awareness of the company. These set of questions were based on the philosophy of one of the quality gurus, Crosby.

The second category of questions (8 to 10) is related to the causes of poor quality in the factories. The objective of these questions is to evaluate the impact of factors such as skills, technology, management commitment and supplier relation.

The third category of questions (11 to 23) was designed to assess the quality improvement efforts made by the management such as technological level, trainings, teamwork, motivation and participation of workers towards quality.

The last category questions (24 to 58) deals with quality performance to understand the current quality standards in the factory. These questions deal with quality planning, quality design, quality control, quality improvement, quality assurance, quality documentation and cost of quality.

### **3.4 Structured Interviews**

The design of the interviews was based on the research objectives. Interviews were conducted with top management of the company. The interviews were used to cross check the reliability of the response to the questionnaire. It is also used to gather additional information to compare the current quality management activity of the company against components of TQM.

### **3.5 Direct Observation**

In this research direct observation is used as a means to assess the techniques used in the production processes as well as the existing facilities of the company. I have paid a visit to the company from mid to end December 2012, and hence was given a guided tour to the production process, visited each department, and reviewed important documents such as company strategic documents, annual reports, procedure manual and inspection data.

## IV. SURVEY RESULT, ANALYSIS AND ASSESSEMENT OF TQM

### 4.1 Survey result and Analysis

According to the first category of questions, the general understanding of quality concept in the factory is higher at the top of the organization and gets lesser as it goes down. According to the second category of the questionnaire 27% of the respondents think that the working environment of the organization is the primary obstacle to improve quality in the company followed by the system of the organization such as policies, rules and procedures as shown in Figure 3.1. 76% of the survived employees think that the organizational structure doesn't motivate them to function better and 84% of the employees think that the work environment of the company isn't conducive.

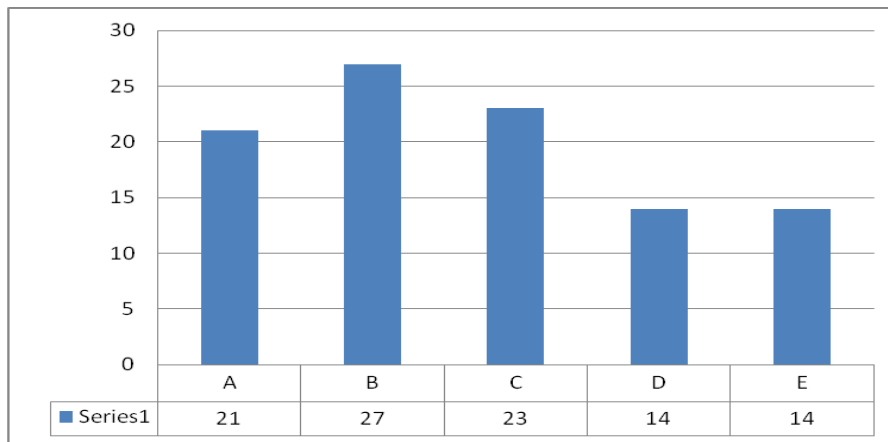


Fig. 3. 1 Obstacles to improve quality in CTE

- A- The system of the organization (like policy, rules and procedures)
- B- The internal working environment
- C- Lack of consistency in the action being taken
- D- Fear and resistance of the management
- E- Lack of the required knowledge and skill

Figure 3.2 shows that 26% of the respondents asserts that poor quality of raw material (green leaf), the same percentage again asserts that lack of quality awareness of employees are the

major cause of poor quality products and also 21% of the respondents think that inadequate training of workers in the company also has a great impact for poor quality product.

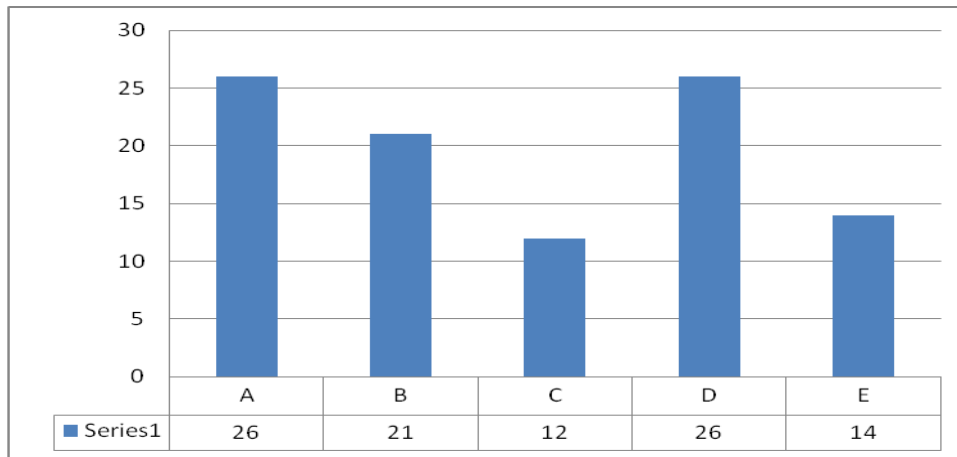


Fig. 3. 2 Cause of poor quality products in CTE

- A- Poor quality of raw materials delivered
- B- Inadequate training of workers in the company
- C- Lack of top management commitment to quality
- D- Low quality awareness of workers in the company
- E- Unavailability of proper technology

Referring to the subjective answers, the quality related problems faced by the company are manifold and includes: lack of quality awareness, lack of proper training, lack of skilled and unskilled manpower, high rate of turnover of management and supervisors, lack of motivation of workers, Poor Infrastructure of the company, high rate of rework/rejects, low Green Leaf Quality, unavailability of Quality Management System and lack of proper inspection techniques.

From the above responses, a Pareto diagram is constructed as shown in Figure 3.3 to reveal the major causes of the problems.

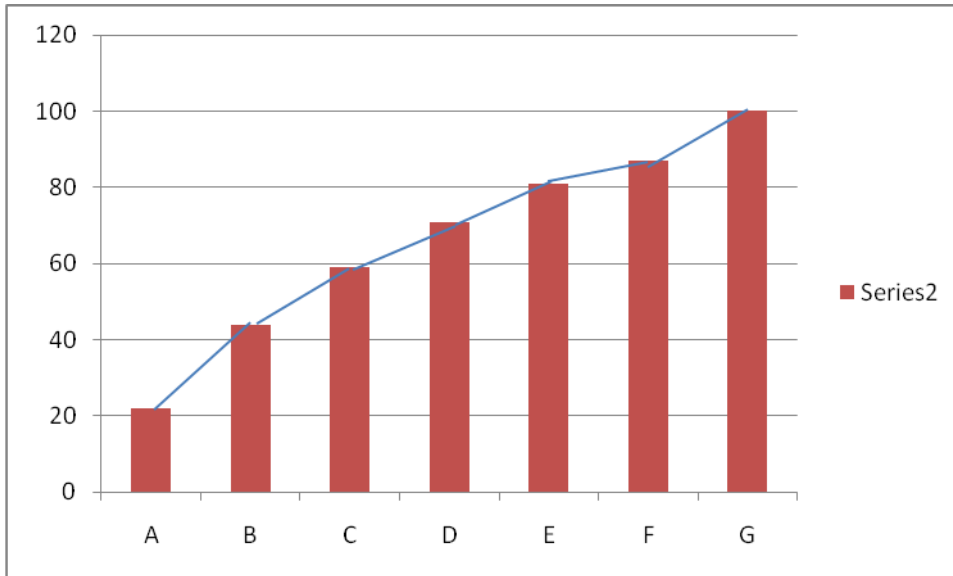


Fig. 3. 3 Pareto diagram for quality related problems in CTE

- A- Low Green Leaf Quality- 22%
- B- Lack of Quality Awareness – 22%
- C- Management problem – 15%
- D- Lack of Proper Inspection Technique – 12%
- E- Lack of both skilled and unskilled manpower - 10 %
- F- Lack of Motivation of Workers – 6%
- G- Others – 13%

The analysis of the Pareto diagram shows that poor quality of the raw material (Green Leaf) and lack of quality awareness among the workers are the major cause of poor quality products in the company getting 22% for each from the respondents.

According to the respondents for the third category of the questions, the frequency of trainings given to employees is very low as a result the overall skill of the employees is low. Only 9% of the employees think that the company provides enough training for workers and 91% think otherwise. The existence of strong cooperation and teamwork is not satisfactory and only 28% think that there is a team work among management and workers and 72% think otherwise. 73% of the respondents agree that the biggest concerns of the management are cost and only 18% think the concern of the management is quality.

The majority of the workers (64%) believes that the incentives and motivation schemes in the company isn't adequate. About the same percentage feel that they are secured with regard to their job and thus are proud of their company. They also feel that there are unsafe working areas in the factory (68%). Most of the employees believe that the company knows what its final consumers need but only 24% think that it has satisfied its consumers where as 76% of them think otherwise. 80% of the Employees believe that the quality control activities of the company are not adequate and they believe that the quality of tea should be improved, the endeavors that are made to this effect are not sufficient and all of them agree on quality improvement programs to be implemented in the company. The overall summary of the result of the statistical analysis of the questionnaire is presented in Appendix B.

## **4.2. ASSESSEMENT OF QUALITY MANAGEMENT SYSTEM OF CTE**

### **4.2.1 Leadership and Organization**

In general, the understanding of quality concept in the company is higher at the top of the organization and gets lesser as one goes down. The quality head think that because of the lower percentage of primary grade and pressure from the market, the leadership is giving serious thought to quality. The management has identified the most commonly demanded quality characteristic from their product, which include fine cut, color (Blackness), aroma, test, briskness and less fiber content. However, the management spends most of its time on detecting the defects of the products rather than preventing the defects. As a result, the quality control activities are inspection-based instead of prevention-based.

Even though there is limited move to quality concept implementation and department for developing quality systems and approaches in the factory, one can easily observe that there is a huge gap with what is regarded as quality-oriented leadership. As a whole, there is a more centralized organizational structure but limited authority for decision-making has been given to different departments especially to quality control. Hence there is very little participation of employees especially in making important decision related to their activities.



Even though Quality system documentation is one of the essential components for quality improvement, CTE does not have quality system documentation in all of the tea processing stage. The company doesn't have quality policy, quality manual or work procedure. There are no properly prepared manuals to assist employees in their day-to-day activities and hence documentation is one of the main areas that the factory must focus. Absence of the same has limited the quality of work and any future effort to improve the tea process and also it has impact on the efficiency of the factory.

And hence top management should demonstrate quality oriented leadership by developing and communicating the quality policy and the importance of meeting customer requirements to the employees. And also make sure that it is understood and applied to the daily work of the organization through the establishment of quality goals and quality objectives. And hence, CTE should maintain a documented quality system as a means of ensuring that its product conforms to specified requirements. This documented system shall include quality manual and work instructions supported with detailed procedures and specifications of the industry. Employees working at each point of the processing can be used to prepare their own work instruction and procedure manual and these manuals should be available for all employees at any time. Top management should also strongly encourage employees' involvement in quality improvement activities, attach great importance to employees' suggestions, take responsibility for employees' actions and be open and willing to listen to the voices of employees.

#### **4.2.2 Green Leaf Plucking**

The primary cause of poor quality of made tea is poor green leaf quality which is supplied internally. Green leaf quality is whole some and involves husbandry on the bush, weather condition, plucking standard and handling of the leaf from field to the factory. Tea processing at the factory has an important role to improve color, texture, palatability, keeping quality, ease of preparation and elimination of toxin and other undesirable constituents. However, made tea quality is dependent on the green leaf quality and all factory processing parameter depend on the quality of the green leaf received at the factory. (Tocklai Tea Research Center of India, 2009)

The farm department has quality inspection supervisors in each unit who supervises pluckers to adhere on the quality plucking standard set by the company. There is widely accepted standard of plucking which is both fine (two leaf/soft three leaves and a bud) and coarse plucking (above three leaf and bud) and payment for pluckers is based on the plucking type where fine plucking has more payment. However, the supervisors says that as the pluckers are paid on volume base and plucking fine will result lower payment, they tend to pluck the coarse leaf most of the time. The quality control activity should be to prevent coarse plucking and encourage fine plucking. But the experience in CTE is that the payment for fine plucking doesn't encourage fine plucking, supervisors only check the leaf quality during weighemnet that is after plucking and little attention is given for up-keeping the tea bushes.

It is also extremely important to deliver the leaf to the factory as soon as it is plucked to enable appropriate controls of the processes that follow. The transporting equipment should be appropriate in terms of design to ensure that leaf quality is preserved in transit to the factory. However, the practice in CTE in leaf handling isn't as per set standard which means they load above the 15 kg limit of the green leaf bag and also the transportation system doesn't encourage the leaf to arrive to the factory with good aeration and without leaf rupture. And also the leaf stay in the field staffed in the bag for more than four hours and when arrived in the factory the leaf already started unwanted withering.

To be able to satisfy the technical tea manufacture requirements, farm management practice should accordingly be structured along the following lines: up keeping operation should encourage good leaf growth, green leaf quality inspection should be during plucking not after, plucked leaf should go directly to the plucking basket, each plucker should weigh the leaf immediately when he has plucked a full basket load, the plucking bag should hold no more than 10 kgs to avoid the leaf generating too much heat under heavy weight and plucked leaf should loosely bagged without pressing and transported to the factory with in less than four hour.

### 4.2.3 Tea Process

**Withering:** the company has 32 withering troughs out of which only 22 have fun, only eight are connected to stem line and all of them doesn't reverse their air operation. The fun mounted on each of the trough is very important as it will suck the moisture out and blow in hot air to facilitate physical withering. As most of the troughs don't have stem line, blowing hot air during wet weather isn't possible to facilitate artificial withering. And hence the factory usually base on natural withering which requires up to 20 hrs adding to more energy and manpower consumption. Besides the company doesn't spread 1,200 kg of green leaf per one trough to utilize the 32 troughs rather they concentrate on the 22 troughs which has fun which result in over staffing and not uniform withering might occur. The withering trough supervisor and the production manager are the one responsible to decide for the green leaf to proceed to the next step for processing. The quality department isn't involved for checking proper withering and the company don't have moisture tester to check the level of moisture or falacity of the leaf instead the supervisor check using his hand which is very subjective and dependent to the experience of the supervisor.

**Rotervan and CTC:** The Company has milling and cheeing machine in its workshop and there is standard of rollers and cutters to be checked and changed after set working hours. The company follow the same very strictly however sometimes foreign matters like stone will be crushed along with the green leaf and no action being taken to stop the process. The Production Manager at the factory indicated that the standard feed for rotervan is 1,200 kg per hour of finely plucked green leaf however in CTE the feed per hour isn't monitored and is mostly more than 1,200 kg and which might require shorter changing of rollers and cutters. And the final product might not have fine cut, proper granular size and may have more fiber due to inappropriate cut caused by inappropriately sharpened cutters.

**Fermentation:** after CTC the fermentation bed accept the tea and carry on to the drier for about 90 minutes. The tea dual (depth) on the bed should be 4-6 cm for proper and uniform fermentation however some time when the CTC is being over feeded the dual depth isn't monitored so uniform and proper fermentation is unlikely to happen which will affect the briskness, aroma, color and test of the tea. There are three temperature readers on different location of the bed and there is also humidifier

and cold air blowing fun beneath the bed to control the fermentation of the tea. The process is being monitored by visual inspection and reading the temperature and moisture on the control board, however no operator monitors the process only the quality head checks it now and then.

**Drier:** the drying process is being done using a stem generated from a boiler using firewood. The stem is being measured at three places; at the inlet temperature should read 140, middle zone should read 120 and at the drier mouth which should read 35 degree centigrade. The stem being generated and supplied to the drier is monitored at the boiler site and there is also a fun which blows cold air to monitor the stem inside the drier. The control board which read these temperatures is being used as controlling devise. As this process reduce the moisture of the tea to 3 percent, and determines the liquor, test and blackness of the tea the amount of stem being released, cold air blown and fermented tea feed to the drier determines the quality of the final tea. The quality department mostly focuses on this operation as it uses the tea being released from the drier to check most of the process indicted above and test this finally produced tea.

**Sorting and grading:** This process doesn't involve major change on the tea and only helps to disintegrate the fiber from more granular primary tea. The sorting machine picks the fiber from the final tea using PVC rollers which is attached with electrostatic magnates. Here as the efficiency of the machine depend on the regular clearing of the fiber from the PVC close supervision is required, however no such regular supervision is there. The granular and tiny fibers which passed through the sorting machine will be segregated by a vibro screen grading machine which collects all primary grades in one mouth and secondary grade on the other. Here also the major quality activity is to look after the amount of the feed tea to the vibro screen. If the feed is too much, the tea might overflow above the vibro screen and go to the bags which collect the other grades. Here also very little attention is given by quality department and some time the primary grade might be mixed and be packed as secondary grade.

**Machinery Maintenance;** the technical department of the factory carries out maintenance of machineries in the factory. The factory manager has said that no preventive maintenance, a documented procedure for maintenance and regularly calibration of instruments is undertaken. Most

of the operators of the machines are below twelve grade and don't have technical knowhow. And hence procedures for operating the machineries and controlling the processes are mainly based on experience of the respective employees. Even though there is a processing procedure manual in the factory it isn't translated to Amharic or no proper training was given for operators and they don't sense what the effect of wrong practice. As the factory bases its major activities like fermentation, drier, boiler and withering which are dependent on temperature reader, the control board has never been calibrated. I have witnessed that production managers and supervisors are always run here and there to check everything and give order for operators to follow.

#### **4.2.4 Quality Control**

The Quality control head assert that he should be the most responsible person in maintaining quality of the tea production. He should be in charge of all the testing, making the appropriate adjustments and recommendations both during the green leaf plucking and process at the factory. Even though there is little room for taking corrective actions using quality control data, the actions taken are mostly from the rich experiences that the operator possesses as there are no formal procedures for taking corrective action or record of action taken. The activity of the quality control is only limited to quality leaf count and testing the final tea after processing.

**Leaf Count:** after the green leaf arrived in the factory a sample will be taken from the lorry to determine the quality of the leaf, however here the quality activity is to determine the leaf count and know what percent is fine and coarse plucking. If the count is above 75% then the green leaf is fine plucking and if it is below then it is coarse plucking. The leaf count is made from the sample taken from green leaf bag in such a way to determine the percentage of two/three soft leafs and bud and also those leafs above three leaf and bud. However, the quality head stress that leaf count doesn't guaranty the quality of the final product as it doesn't capture the texture of the leaf ( if it is stayed more than four hour in the field it will immediately start unwanted withering), the health of the bush (even if the leaf is fine sometime its growth may affect final product) and the way the green leaf loaded in the bag (if the bag is loaded more than 15 kg the leaf will be squeezed and start unwanted withering) and also foreign matters like other plant leaf doesn't get attention which are the critical determining factors of the quality of the final made tea. The quality head writes a report also to the General

Manager when leaf count become very bad and there is a monthly quality meeting between the farm, factory and GM which is a good move of the company. But the meeting doesn't regularly being undertaken and resolution isn't being recorded for further improvement.

There is also a tea testing laboratory where tea testing is carried out. The quality head takes sample from drier mouth and test the tea every one hour and gives a report to the factory manager however the tea has been already produced but it will give good guidance for the production manager where to focus for the next processing. There is a documented set of standards for quality characteristics for both raw material and finished product. These standards are expressed as a test result carried out by the laboratory and these quality standards are the bases for segregation of non-conforming products. However, the tests performed are inferior to the standards mainly because the laboratory is ill equipped and also no statistical techniques with formal procedures are used in the analysis of the quality of tea during and at the end of the process.

Generally speaking, Management of Chewaka Tea Estate spends most of their time detecting the defects of the products rather than preventing the defects. As a result, the quality control activities are inspection-based instead of prevention-based. Inspection actually does not build quality; quality is built into the process. If quality can be ensured, it is not necessary to implement inspections. In fact, defective products cannot be reduced merely by making improvements at the inspection stage, although such improvements may eliminate defects in delivered goods. When a defect shows up, the information should be sent back to the work stage so that processing can be corrected.

Thus, to prevent defects occurring in the first place Tea process inspection should be done at three stages i.e.

1. Raw material inspection: The inspection of green leaf before and during plucking from the farm.
2. In-process inspection: The primary purpose of the in-process inspection is to identify problems as early as possible and should be carried out at each processing stage
3. Final inspection: to segregate defects and identify problem areas

CTE should continuously use quality control tools for measuring, prioritizing and improving its processes. Therefore, the applications of any of the seven quality control tools – flow chart, pareto diagram, cause and effect analysis, scatter diagram, check sheet, histogram, and process control chart, statistical process control is mandatory.

#### **4.2.5 Education and Training**

It was noted that the general awareness of quality in the company is low as one growth down to the line workers. The frequency of trainings given to CTE employees is very low. As a result the overall skill of the employees is poor. Training is very critical for the success of the company as it enables the workforce to acquire the skills needed to improve and maintain the quality of the production process.

Education and training should be given on continual basis to improve the performance of workers. Every employee in the company needs to be given necessary job training so that they can perform their jobs better. Different employees need different skills and should accept different training. Therefore, the company needs to develop criteria for job requirements and identify characteristics and skills needed by employees. The development of employees' skills and capabilities should be harmonized with the development of technology in the industry. In order to make the company more productive and competitive, managers should invest further in training employees, as this can result in more competent and committed employees.

#### **4.2.6 Self Evaluation**

The company has a “Tea Processing Manual” produced by a Kenyan expatriate but this manual hasn't been translated to quality manual or work procedure and also it is found in the shelf of the office of the General Manager. Since the company doesn't have quality policy, manual or work procedure there is no system of self evaluation for quality activities of the company. In order to have a continuous improvement, it is essential that CTE monitors its performance on regular basis. Self-assessment allows the company to discern clearly its strength and weakness as a result, improvement areas can be identified and proper actions can be taken. One of the self-assessment techniques used is quality auditing through which, CTE can identify its problems and take

necessary measures to solve them. The outputs of quality audits are very valuable for quality improvement activities. CTE can also use the other technique of self assessment which is benchmarking. Through benchmarking, the company will be able to compare its practice and performance against that of international competitors. As a result, it can understand its gap and can improve its overall performance.

#### 4.2.7 Cost of Quality (COQ)

It was noted that the company does not measure its COQ which is very useful measurement tool for the company and can be used very effectively to identify and prioritize improvement opportunities. Although the company does not calculate its cost of quality, this research work estimates its COQ for the fiscal year 2011/2012 based on the data collected from document review. As indicated in the production process of tea in section 2.4, an international standard of tea production the first grade should be at least 80% of the final product and the remaining 20% should be second grade. However as per the annual report of CTE for 2011/12 budget year these figures were 53 and 47 % respectively. Considering the selling price of Birr 39 and 25 for one kg of tea and based on the components of COQ discussed in section 2.3.8.2, the total COQ is calculated as follows:

#### **Total Production of tea in 2010/11; 973,679 kg**

##### **Actual Grade percentage**

- Primary Grade; 526,447 (53%)
- Secondary Grade; 471,782 (47%)

##### **If TQM applied**

- Primary Grade; 798,583 (80%)
- Secondary Grade; 199,646 (20%)

#### ***Internal failure cost***

Table 4.4.1 Internal failure cost of CTE -

Product Type	Actual Performance			With TQM			QOQ
	Weight in kg	Selling Price per kg	Earning	Weight in kg	Selling Price per kg	Earning	
First Grade	526,447.11	39.00	20,531,437.38	798,583.29	39.00	31,144,748.31	10,613,310.92
Second Grade	471,782.00	25.00	11,794,550.00	199,645.82	25.00	4,991,145.56	-6,803,404.44
<b>Total Production</b>	<b>998,229.11</b>		<b>32,325,987.38</b>	<b>998,229.11</b>		<b>36,135,893.87</b>	<b>3,809,906.49</b>

(source; Annual Report of CTE for 2011/12 and own calculation)



**Rework cost:** The rework cost is the cost of re-processing the defective tea after inspection. Normally tea will go back to rolling to be reprocessed with a new green leaf coming to the process, and hence considering 9.8 Birr per kg processing cost at the factory alone, the cost of reprocessing of 52,340 kg of tea during 2011/12 budget year was Birr 512,932 (Chewaka Tea Estate, 2012)

**External failure cost**

**Returns:** According to the fiscal year 2010/11 the company has lost a total of 332,000 birr due to the buyer downgraded the 23, 714 kg primary grade tea to secondary grade.

**Appraisal cost**

**Inspection cost:** The Company has 4 quality supervisors with an average salary of Birr 1,250. Therefore, the total inspection cost for the fiscal year 2010/11 was 1,250 Birr x 4 persons x 12 months = 60,000 Birr.

**Quality Audit cost:** The factory has an internal quality control Head with a monthly salary of Birr 3,500 and an assistant of Birr 1,200. Therefore, the total quality audit cost for the fiscal year is Birr 56,400 Birr.

**Prevention cost**

**Quality related training:** The company does not have training cost and relies on job training given by senior staffs of its own.

**Total cost of quality = Internal failure cost + External failure cost + Appraisal cost+ Prevention cost**

Therefore, the total cost of quality for the fiscal year 2011/12 is Birr 4,258,307

Table 4.4.2 Estimated COQ by element

	Quality cost element	Total cost (Birr)	Percentage
	Prevention cost	-	-
	Appraisal cost	116,400.00	3.00%
	Internal failure cost	3,809,906.49	89.50%
	External failure cost	332,000	8%
	<b>Total cost of quality</b>	<b>4,258,307</b>	<b>100%</b>

(Source; Annual report and own calculation)

The analysis of on the above table shows that 89.5% of the total cost of quality is the result of internal failure cost and the company does not incur any prevention cost. The management should give utmost attention on calculating its cost of quality, which will help the company to indentify and attack the failure costs and drive them to zero. Implementing this strategy results in problem solving and improving the processes that produce quality tea.

#### **4.2.8 Customer Focus**

The company sells majority of its product to its sister company in Dukem but a growing proportion is being sold abroad. Through interview with Dukem Factory Manager I have understood that the quality concern is much felt by this side as they are the link with the final consumer. And also they have said they have started producing high value tea which has premium quality and higher selling price, for which if Chewaka Tea Estate produces as per requirement of this factory, the factory is ready to offer better price. However, CTE doesn't have proper marketing information system and focus for consumer is very little as the management focuses on production and supply of its tea to the sister company.

CTE should have a regular forum for discussion on quality issue with its customer and should also conduct a market study both for the local and international market which can assist for obtaining various suggestions for improving the quality and the associated benefit for initiating manufacturing of quality product. Through market investigation, the strengths and weaknesses of its product and its competitors can be identified and the same information can be used for benchmarking so as to determine the improvement areas. And hence, CTE should equally be sensitive to changing and emerging customer and market requirements, competitors' offerings, and the factors that drive customer satisfaction and also it should understand and strive to meet the quality requirement of its costumer.

## **VI. SUMMARY, CONCLUSION AND RECOMMENDATION**

### **6.1 Summary**

Based on the survey, interview and physical observation, this research work addressed the current situation of quality related problem of Chewaka Tea Estate. The research work has also tried to review the concept of quality management system and benefits of implementation of the same for the company so that it will emerge as more competitive and profitable. The research work has briefly discussed on how tea manufacturing process should be handled, the components of Total Quality Management and how these practices can be implemented in the company to foster growth.

The research has found out that the quality concept is known by the management of the company and they feel that internationally recognized certification can be used as future competition weapon, however the commitment and fund available for quality improvement activities in the company is found to be very low. Even though the company has a “tea production hand book” prepared by Kenyan expatriate; there is no quality manual or quality policy which would have been easily developed from the hand book. This handbook details how tea processing should be handled, what are the malfunctions which will affect the quality of the tea and how each process should be managed to manufacture good quality tea.

The lower attention given to quality by the company is resulting in production of greater proportion of secondary grade and as a result the company is losing quit a big amount of money. The research work has also calculated cost of quality of the company which is found to be close to 4.8 million birr. In order to overcome the above stated problems, the research has assessed the Total Quality Management practice of the company against TQM elements which are classified in to six components. These components are quality oriented leadership, green leaf supply, processing technique, provision of education and trainings, proper quality control and implementing quality system activities. The research work explained the gap observed in the operation of the company with respect to these components and hence identified potential areas for quality improvement in the company which will enable the company to tackle the quality problems identified.

## 6.2 Conclusion

The data analyses conducted in this research work revealed that there are a number of quality related problems in the company. These problems can be broadly summarized as: poor green leaf supply, inappropriate tea processing procedure, lack of proper education and trainings, poor leadership, weak external customer focus and poor quality control activities are some to mention.

It is clearly indicated in the literature review that each tea production processing machineries has specific quality parameter and maintaining the same will guarantee the quality of the final product, however the tradition on the quality control activity of the company is to do quality analysis after the final product is produced. The quality of finished product is tested at the final stage of the production where once damage has happened and correction action is impossible. The quality control activity should have been started and carried out continuously from the field before plucking operation was undertaken, during transportation of the leaf to the factor, during weathering, CTC, Fermentation and Drier so that the management can act and adjust on each specific processing as appropriate at spot so that it can lower secondary grades and rejects. The company performs its operation based on individual leadership and hence focus for quality in its every operation lays on the motivation of the supervisors as there is no quality documentation for most of its operation.

The research has also calculated the Cost of Quality of the company which has shown how easily the company is losing money due to the low attention given to avoid the internal failure costs. The research has found out that the company spends most of its time to prevent quality through inspection but if quality has been incorporated in every activity of the operation and TQM being implemented properly the failure cost can easily be avoided.

The fact that recent government policy trend of imposing mandatory standards in food items will be effective soon in tea sector, as international markets are demanding certifications and are offering better price for the same, as quality awareness of consumers has increased in recent years and competition is very fierce to bet one another; Chewaka Tea Estate is left with no other option

other than to start implementation of Total Quality Management system and further go for International Certifications.

And hence, as pointed out on the discussion of the concept of TQM in relation to tea industry and grounded on data analysis of quality practice of Chewaka Tea Estate in relation to TQM elements, the research work conclude that proper implementation of TQM in Chewaka Tea Estate can increase the primary grade tea the company produces, enhance its profitability and enable the company to be competitive in the local and international market.

### **6.3 Recommendation**

To be competitive in today's market, it is essential for the company to provide more consistent quality product and value to its customers. There is good evidence that the full implementation of TQM increases competitiveness and customer satisfaction, reduces waste and improves the working lives of employees (Ana Reyes Pacios Lozano, 1997) And hence now is the time for CTE to place behind the old approach to management style which asserts whatever produced can have market somewhere rather CTE should develop better and more direct relationships with customers, initiate more teamwork and produce better quality product efficiently.

This research work has grounded in the literature and data analysis that implementation of TQM program can help CTE to meet the quality demand of its consumers and improve its production efficiency which in-turn helps the company to be competitive both in the locally and globally market. And also implementation of TQM by the company will result in profound achievement such as increase of primary grade tea, reduction in cost of production, better utilization of manufacturing capacity and hence increase of earning and emerge as more profitable company benefiting both the shareholders and the society.

And hence the research work recommends Chewaka Tea Estate should engage in implementation of TQM program with a project approach as outlined here under as an eight guide line steps. However, the company should also note that implementation process of TQM requires high commitment of

management, repeated trainings, involvement of experts from different field of study and a considerable amount of investment.

### ***Step 1: Top Management Commitment***

Top management of the company should demonstrate a commitment and a determination to implement the proposed quality improvement program. Without top management commitment, no quality initiative can succeed. The top management should provide evidence of its commitment to the development and implementation of the continuous quality improvement program by communicating to the organization the importance of implementation of TQM towards achieving company objectives.

- Define the organization's quality policy and make this known to every employee
- Ensure that quality objectives are established at all levels and functions
- Ensure the availability of resources required for the development and implementation of the quality management system
- Appoint a management representative to coordinate quality management system activities
- Conduct management review

### ***Step 2: Establish Implementation Team***

The next step is to establish implementation team to plan and oversee implementation. Its members should include representatives of all functions of the organization – Farm, Factory, planning, Human Resource, quality control, etc. The members of the implementation team should be well trained.

### ***Step 3: Provide company-wide training***

Quality awareness programs should be conducted to communicate to the employees the aim of the quality improvement, the advantage it offers to employees, customers and the organization. It also shows the roles and responsibilities of the employees within the system. A top-to-bottom briefing exercise is often the best way to explain about quality within the company. The awareness program should emphasize the benefits that the company gets through quality improvement. The programs

could be run either by the implementation team or by experts hired to talk to different levels of employees.

At the completion of the awareness program it is necessary to measure the effect. This can be done by the simple expedient attitude survey test. This is because of the fact that surveying people increases the awareness of the issues in question.

#### ***Step 4. Formulate a quality planning***

The company should start planning from the initial outline plan as there will be a series of projects which have to be identified. These should cover education and training on a more extensive scale as well as the actions needed. For each project, there should be a time-phased plan identifying targets and milestones, resources required, costs and projected benefits.

#### ***Step 5. Implement quality improvement plan***

Once the plans are prepared, it is the task of the team to prioritize them and to allocate resources. It is a good idea to put into effect some projects, which will show quick and clearly visible benefits. This helps to build up enthusiasm.

#### ***Step 6. Observe and check of results***

The implementation of the improvement plan needs to be continually monitored to understand whether things are going according to the plan and causing the expected change. This process also includes checking immediate results by implementing the improvement plan in order to understand whether the system is functioning. If necessary, corrective measures should be taken to ensure that the plan is effectively implemented. The effects of implementing the improvement plan on overall business performance should be checked.

#### ***Step 7. Investigate and analyze results***

After the implementation of the quality improvement practices are checked, the company can obtain a great deal of information about its implementation and its effects on overall business performance. Therefore, it is essential to analyze the results obtained from the check stage. The

analysis of results shows whether the implementation of the plan effectively improves the overall business performance.

***Step 8: Implement the result on a wider scale:***

If the analysis concludes that the implementation has not been effective, the PDCA cycle returns to the plan stage to search for other improvement plans that may have better effects. If the implementation of the improvement plan has produced the desired results, the firm should consider how to consolidate the results. Hence, the PDCA cycle continues forever in the never-ending improvement.



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## APPENDIX A

### QUESTIONARE PART I

The purpose of this questionnaire is to identify quality associated problems in Chewaka Tea Estate and give appropriate solutions so that the business can be competitive in the domestic as well as global market. As you are one of very prominent worker of the company we kindly request you to give us the following information genuinely. Give short or brief answer for subjective questions.

Answer the following questions by rating

5 = Excellent /Very High

4 = Very good / High

3 = Good /Moderate

2 = Fair /Low

1 = Poor /Nill

1. Quality is a measure of goodness of a product that can be defined as fair, good excellent.	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
2. The economics of quality require that management establish acceptable quality levels as performance standards	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
3. The cost of quality is the expense of doing things wrong	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
4. Inspection and test should report to the concerned body so that the body can have the proper tools to do job	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
5. Quality is the responsibility of the quality department	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
6. Workers attitude about quality are the major cause of defects	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
7. The biggest problem today is that customers have low understanding about quality	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>

8. Which of the following are the obstacles to improve quality in your company? (Mark all that are applicable).
- A. The system of the organization (Policy, rules, procedures, etc)
  - B. The internal working environment.
  - C. Lack of consistency in the action being taken.
  - D. Fear and resistance of the management.
  - E. Lack of the required knowledge and skill
9. What are the causes of poor quality products in your company? Mark all that fare applicable.
- A. Poor quality of Green leaf and other materials delivered from suppliers.
  - B. Inadequate training of workers in the company.

- C. Lack of top management commitment to quality.
- D. Low quality awareness of workers in the company.
- E. Unavailability of proper technology.

10. In Your view, what are quality related problems faced by your organization?

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		1	2	3	4	5
11	How high is your role and participation in quality activities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	Employee job satisfaction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	Frequency of training given to employees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	Overall skill of the operators in the company	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	Placement of the right person in the right job	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	Frequency of feedback provided by managers to employees about their work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	Existence of strong cooperation and teamwork in the company	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18	Extent of employees participation in the product improvement process	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19	Incentives/ recognition for best performance of workers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20	Quality awareness level in the company	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21	Compatibility of the quality of your products with the products manufactured by the market leaders in the local and global market place	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22	Technological level of the company.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23	Rate of rework	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

24. Is there a quality circle in the company?      Yes            No     

25. What seems to be management's biggest concern?

- A. cost
- B. schedules
- C. Quality

26. How large resource do you allocate (including money) for quality compared to the total budget?

Large     Medium     Small

		5	4	3	2	1
27	Level of linkage of the objectives of the company to customer need and expectation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28	Consideration of customers' satisfaction in strategic planning of your company	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29	Degree of communication of your company with its customers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30	Market Competition viewed as a basis for comparison	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31	Extent of handling customer complaints quickly and positively	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32	Understanding customers' expectations concerning your products	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33	Customers' satisfaction with the quality of your products	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34	Degree of availability of in process inspection for green leaf and other input materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35	Level of availability of in-process inspection techniques	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36	Degree of availability of proper inspection techniques for finished products	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37	Extent to which inspection, review or checking of work is automated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38	Extent to which quality data are used as tools to manage quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39	Level of recognizing and solving quality related problems in the company	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

40 How are process planned and controlled to assure quality?

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41 Sketch the process flow of the products?

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42	Does the company use statistical control charts for process control?	yes	<input type="checkbox"/>	No	<input type="checkbox"/>
43	Are data for cost of quality available in the company?	yes	<input type="checkbox"/>	No	<input type="checkbox"/>
44	Does the company Plan for quality?	yes	<input type="checkbox"/>	No	<input type="checkbox"/>
45	Does the company have quality manual?	yes	<input type="checkbox"/>	No	<input type="checkbox"/>
46	Does the company have quality objectives?	yes	<input type="checkbox"/>	No	<input type="checkbox"/>
47	Does the company set its goals and targets?	yes	<input type="checkbox"/>	No	<input type="checkbox"/>
48	Does the company establish its clear vision of the future?	yes	<input type="checkbox"/>	No	<input type="checkbox"/>
49	Does the company have documentations of quality procedures, inspection systems, and quality analysis?	yes	<input type="checkbox"/>	No	<input type="checkbox"/>
50	If yes, are the records properly filed and easily retrievable?	yes	<input type="checkbox"/>	No	<input type="checkbox"/>
51	Does the company evaluate its activities?	yes	<input type="checkbox"/>	No	<input type="checkbox"/>
52	Does the company have an internal/ external quality audit system for its overall activities?	yes	<input type="checkbox"/>	No	<input type="checkbox"/>
53	Does the management take timely action on deficiencies found after auditing?	yes	<input type="checkbox"/>	No	<input type="checkbox"/>
54	Does the company have a procedure for evaluating suppliers?	yes	<input type="checkbox"/>	No	<input type="checkbox"/>
55	Is the company taking action for continues process improvement to improve the way things are being done?	yes	<input type="checkbox"/>	No	<input type="checkbox"/>
56	Is your company implementing total quality management, BPR or any other improvement programs?	yes	<input type="checkbox"/>	No	<input type="checkbox"/>
57	In your view, has the quality of the products of your company improved during the last one to two years?	yes	<input type="checkbox"/>	No	<input type="checkbox"/>
58	Do you propose for quality improvement?	yes	<input type="checkbox"/>	No	<input type="checkbox"/>

**Questionnaire II**

ይህ መጠይቅ፣ በጨዋታ ሻይ ልማት በጥራት ዙሪያ ያሉ ችግሮችን ለመለየት እና ድርጅቱ በሀገር ውስጥም ሆነ በውጭ ገበያ ተወዳዳሪ ሊያደርገው የሚችል ስትራቴጂ ለመንደፍ የሚያስችል ጥናት ለማካሄድ አንደግባዓት የሚረዳ ነው። ይህ በመሆኑ እርስዎ እንደ ድርጅቱ አባልነትዎ ከሚያውቁዎቸው ነገሮች በመነሳት ከዚህ በታች ለቀረቡት ጥያቄዎች ትክክለኛ ምላሽ በመስጠት እንዲተባበሩን እንጠይቃለን።

1. ድርጅቱዎ የደንበኞቹን የምርት ጥራት ፍላጎት በሚገባ ያውቃል ብለው ያምናሉ?  
አዎ  አላምንም
2. ደንበኞች በምርታችሁ ጥራት ረክተዎአል ብለው ያመናሉ? አዎ  አላምንም   
አሁን ያለው የምርት ጥራት መሻሻል አለበት ብለው ያምናሉ? አዎ  አላምንም
3. የምርት ጥራትን ለማሻሻል የማደረጉ ጥረቶች በቂ ናቸው ብለው ያምናሉ? አዎ    
አላምንም
4. የምርት ጥራትን ለማሻሻል የሚደረጉ ጥረቶች ሠራተኛውንም በሙሉ ያሳትፋል ብለው ያምናሉ? አዎ  አላምንም
5. በቂ የሆነ መረጃ ስለድርጅትዎ ወቅታዊ ሁኔታ አገኛለሁ ብለው ያምናሉ? አዎ    
አላምንም
6. የድርጅትዎ የጥራት ፖሊሲ፣ ራዕይ፣ ግብና ዓላም በትክክል ያውቁታል? አዎ    
አላውቅም
7. የድርጅትዎ አደረጃጀት የስራ አፈፃፀምን የሚያበረታታ ነው ብለው ያምናሉ? አዎ    
አላምንም
8. በድርጅቱ አመራር /ማኔጅመንት/ እና ሠራተኞች መካከል ጤናማ የሥራ ግንኙነት አለ ብለው ያምናሉ? አዎ  አላምንም
9. በድርጅቱ ውስጥ ለሠራተኞች ማበረታቻና የማትጊያ ፕሮግራሞች አሉ ብለው ያምናሉ?  
አዎ  አላምንም
10. በድርጅቱ ውስጥ በቂ ስልጠና ለሠራተኞች ይሰጣል ብለው ያምናሉ? አዎ  አላምንም
11. ሁሉም ሠራተኞች ለምርት ጥራት ኃላፊ ናቸው ብለው ያምናሉ? አዎ  አላምንም
12. በድርጅቱ ውስጥ በቂ የሆነ የጥራት ቁጥጥር አለ ብለው ያምናሉ? አዎ  አላምንም

13. ለድርጅትዎ ተስማሚ የሆነ ዓለም አቀፍ የጥራት ደረጃ ያውቃሉ? አዎ  አላውቅም   
መልስዎ አዎ ከሆነ ይግለጹ \_\_\_\_\_

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14. በድርጅቱ ውስጥ የአሠራር መመሪያ /ማንዋል/ አለ? አዎ  የለም

ካለ ይህን መመሪያ በስራ ሂደት ይጠቀሙበታል? አዎ  አላምንም

15. በድርጅቱ ውስጥ የስራን መንፈስ የሚያነቃቃ ሁኔታ አለ ብለው ያምናሉ? አዎ    
አላምንም

16. በድርጅቱ ኩራትና የስራ ዋስትና ይሰማዎታል? አዎ  አይመስለኝም

17. በትርፀቱ ውስጥ በቂ ጥንቃቄ ያልተደረገባቸውና አደገኛ  ስራ ቦታዎች አሉ? አዎ    
 ለም



## APPENDIX B

### SURVERY RESPONSES SUMMARY TO QUESTIONNAIRES FOR QUALITY MANAGEMENT PRACTICES IN ETHIOPIAN TEA COMPANY

#### General Information

Total number of questionnaires distributed	80
Number of respondents	43
Response in percent	54%

#### PART I

1. Quality is a measure of goodness of a product that can be defined as fair, good, excellent.  
Yes 79% No 21%
2. The economics of quality require that management establish acceptable quality levels as performance standards. Yes 74% No 26%
3. The cost of quality is the expense of doing things wrong. Yes 16% No 84%
4. Inspection and test should report to the concerned body so that the body can have the proper tools to do job. Yes 84% No 16%
5. Quality is the responsibility of the quality department. Yes 53% No 47%
6. Workers attitude about quality are the major cause of defects. Yes 79% No 21%
7. The biggest problem today is that customers have low understanding about quality.  
Yes 26% No 74%
8. Which of the following are the obstacles to improve quality in your company? (Mark all that are applicable).
  - f. The system of the organization ( policy, rules, procedures, etc) 21%
  - g. The internal working environment. 27%
  - h. Lack of consistency in the action being taken. 23%
  - i. Fear and resistance of the management. 14%
  - j. Lack of the required knowledge and skill. 14%
9. What are the causes of poor quality products in your company? (Mark all that are applicable).
  - f. Poor quality of raw materials delivered from suppliers. 26%
  - g. Inadequate training of workers in the company. 21%
  - h. Lack of top management commitment to quality. 12%
  - i. Low quality awareness of workers in the company. 26%
  - j. Unavailability of proper technology. 14%

10. Summary of quality related problems in the company

- Lack of quality awareness
- Lack of proper training
- Lack of both skilled and unskilled manpower
- High turnover of management and supervisors
- Lack of motivation of workers
- Poor infrastructure
- Low technological Level
- High rate of rework/rejects
- Low green leaf quality
- Unavailability of Quality Management
- Lack of proper inspection techniques

		1	2	3	4	5
11	How high is your role and participation in quality activities?	21%	0%	32%	8%	5%
12	Employee job satisfaction	21%	16%	37%	11%	16%
13	Frequency of training given to employees	42%	21%	37%	0%	0%
14	Overall skill of the operators in the company	26%	21%	32%	21%	0%
15	Placement of the right person in the right job	21%	16%	26%	32%	5%
16	Frequency of feedback provided by managers to employees about their work	26%	11%	32%	32%	0%
17	Existence of strong cooperation and teamwork in the company	21%	11%	37%	26%	5%
18	Extent of employees participation in the product improvement process	0%	26%	42%	21%	11%
19	Incentives/ recognition for best performance of workers	32%	32%	21%	5%	11%
20	Quality Awareness level in the company	16%	37%	26%	11%	11%
21	Compatibility of the quality of your products with the products manufactured by the market leaders in the global marketplace	5%	21%	26%	26%	21%
22	Technological level of the company	5%	21%	26%	26%	21%
23	Rate of rework	0%	26%	32%	26%	16%

24. Is there a quality circle in the company? Yes 21% No 79%

25. What seems to be management's biggest concern?

- a. Cost 73%
- b. Schedules 9%
- c. Quality 18%

26. How large resource do you allocate (including money) for quality compared to the total budget?

- A. Large 5%
- B. Medium 32%
- C. Small 63%

		<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>
27	Level of linkage of the objectives of the company to customer needs and expectations	0%	19%	44%	19%	19%
28	Consideration of customers' satisfaction in strategic planning of your company	0%	19%	31%	25%	25%
29	Degree of communication of your company with its customers	0%	19%	31%	25%	25%
30	Market Competition viewed as a basis for comparison	19%	31%	38%	6%	6%
31	Extent of handling customer complaints quickly and positively	6%	31%	38%	13%	13%
32	Understanding customers' expectations concerning your products	19%	19%	44%	19%	0%
33	Customers' satisfaction with the quality your products	13%	19%	44%	19%	6%
34	Degree of availability of proper inspection for green leaf and other input materials	6%	25%	25%	31%	13%
35	Level of availability of in-process inspection techniques	6%	13%	38%	25%	13%
36	Degree of availability of proper inspection techniques for finished products	19%	13%	50%	13%	6%
37	Extent to which inspection, review or checking of work is automated	6%	13%	31%	25%	25%
38	Extent to which quality data are used as tools to manage quality	6%	13%	31%	19%	31%
39	Level of recognizing and solving quality related problems in the company	6%	0%	31%	44%	19%

42. Does the company use statistical control charts for process control? Yes 35% No 65%

43. Are data for cost of quality available in the company? Yes 41% No 59%
44. Does the company plan for quality? Yes 77% No 23%
45. Does the company have quality manual? Yes 41% No 59%
46. Does the company have quality objectives? Yes 77% No 23%
47. Does the company set its goals and targets? Yes 88% No 12%
48. Does the company establish its clear vision of the future? Yes 77% No 23%
49. Does the company have documentations of quality procedures, inspection systems, and quality analysis? Yes 18% No 82%
50. If yes, are the records properly filed and easily retrievable? Yes 12% No 88%
51. Does the company evaluate its activities? Yes 59% No 41%
52. Does the company have an internal/external quality audit system for its overall activities? Yes 29% No 71%
53. Does the management take timely action on deficiencies found after auditing? Yes 24% No 66%
54. Does the company have a procedure for evaluating suppliers? Yes 35% No 65%
55. Is the company taking action for continuous process improvement to improve the way things are being done? Yes 29% No 71%
56. Is your company implementing total quality management, BPR or any other improvement programs? Yes 12% No 88%
57. In your view, has the quality of the products of your company improved during the last one to two years? Yes 18% No 82%
58. Do you propose for Quality Improvement? Yes 65% No 35%

## PART II – ENGLSIH TRANSLATION

1. Do you think that your organization knows its customers requirement? Yes 60% No 40%
2. Do you think customers are satisfied with your company's product? Yes 24% No 76%
- Do you propose for Quality Improvement? Yes 100% No 0%
3. Is your company's quality improvement program is adequate? Yes 20% No 80%
4. Do you think that quality improvement activities are participatory? Yes 48% No 52%
5. Do you get adequate and updated information about your company? Yes 36% No 64%
6. Do you know your company's Quality policy, vision, goal and objectives? Yes 32% No 68%
7. Do you think the organizational structure motivates your work? Yes 24% No 76%
8. Do you think there is team work between management and workers? Yes 28% No 72%
9. Do you think there are enough motivational incentive programs for workers? Yes 36% No 64%
10. Do you think that the company provides enough training for its workers? Yes 9% No 91%
11. Do you think that all workers are responsible for quality of a product? Yes 60% No 40%

12. Do you think that there is adequate quality control system in the company? Yes 20% No 80%

13. Do you know international quality standards relevant for your company? Yes 20% No 80%

14. Is there a working manual in your company? Yes 64% No 36%

If yes do you implement in your daily work assignment? Yes 55% No 45%

15. Do think that there is conducive work environment to accomplish your their assignments effectively? Yes 16% No 84%

16. Do you fill that your job is secured and are you proud of your company? Yes 64% No 36%

17. Do you observe jobs which are hazardous and require more safety? Yes 68% No 32%