COST OF QUALITY AND ORGANIZATIONAL PERFORMANCE IN SUGAR MANUFACTURING FIRMS IN KENYA

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DECLARATION

I declare that this research proposal is my own original work and does not contain any material previously submitted for a Degree or Diploma in any university. It does not include any material published or written by any other person or group apart from legitimate, where legitimate reference is made as is in accordance with copy right laws and stipulations.

Sign…… Date……

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D61/81846/2015

DECLARATION BY THE SUPERVISOR

This research proposal has been presented for examination with my approval as the university supervisor.

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DEDICATION

I whole heartedly dedicate this project work to my entire family members: my wife Jacky, daughters Jean, Angela, Wendy and Crystal for their wonderful encouragement and patience during the entire period and in a special way my Mum Mama Philomena M. Obiny for her continued special prayers, and together with my wonderful classmates for their critical contribution to the study in one way or the other.

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ABBREVIATION AND ACRONYMS

AC	Appraisal Cost
ACA	Appraisal Cost Activity
ACE	Appraisal Cost Expenditure
ASQ	America Society for Quality
COGQ	Cost of Good Quality
COMESA	Common Market for Eastern and Southern Africa
COPQ	Cost of Poor Quality
COQ	Cost of Quality
EFC	External Failure Cost
EFCA	External Failure Cost Activity
EFCE	External Failure Cost Expenditure
GDP	Gross Domestic Product
IFC	Internal Failure Cost
IFCA	Internal Failure Cost Activity
IFCE	Internal Failure Cost Expenditure
ISO	International Standard Organization
KSB	Kenya Sugar Board
KSD	Kenya Sugar Directorate
PC	Prevention Cost
PCA	Prevention Cost Activity
PCE	Prevention Cost Expenditure
PDCA	Plan-Do-Check-Act
PIQC	Pakistani Institute of Quality Control
ROQ	Return on Quality
SWOT	Strength Weaknesses Opportunity Threats
TQC	Total Quality Control
TQM	Total Quality Management

ABSTRACT

Cost of quality, following previous research reports have been identified to have significant influence on the nature and possible level of final product or service quality that would satisfy the need of the customer with resultant organizational performance leverage. Cost of quality systems implementation by organizations is no doubt a consumer of resources, hence the need for its recognition, identification, measurement and evaluation. Saijala, Basak and Viswanadhan (2015) in their study on Hidden Cost of Quality: measurement and analysis, held that Cost of quality are those expenses incurred by an organization in an attempt to achieving and maintaining good quality alongside managing poor quality throughout its line of operations with the aim to attaining highest level of customer satisfaction. The Kenya Sugar Directorate (2009) held that locally produced sugar manufacturers has remained less-competitive with the cost of production at about $ 600 per ton and therefore higher than anywhere else in the COMESA region. This is significant and would impact the performance of the organizations, which was the attraction to the researcher, who aimed at finding out possible contribution and relationship between cost of quality and organizational performance, through its influence on the cost of production. The study employed descriptive cross-sectional survey as the desired research design, alongside quantitative statistical analysis tools. The research findings indicated strong correlation coefficients which measured the quality of prediction for the dependent variable, organizational performance, by the COQ categories as held in table 25 with R = 0.994 for prevention cost expenditure(PCE) which shows a strong level of prediction for the dependent variable, organizational performance. The R^2 being the coefficient of determination for PCE at R^2 = 0.970 translates to 97% strength of prediction with the other 3% not explained. R value for appraisal cost expenditure (ACE) at R = 0.949, equally shows a strong level of prediction of the dependent variable. The R^2 which is the coefficient of determination for ACE, R^2 = 0.752 indicate 75.2% strength with the other 24.8% is not explained. R value for external failure cost expenditure (EFCE) at R = 0.983, which also shows a strong level of prediction. The R^2 which is the coefficient of determination for EFCE, R^2 = 0.916 indicating 91.6% with the other 8.4% is not explained. These levels of prediction strengths lead to a conclusion that COQ categories activities would attract significant expenditure levels by the sugar manufacturers so as to have strong influence the overall organization performance, hence the proof for the relationship between cost of quality and organizational performance in the sugar manufacturing firms in Kenya.

CHAPTER ONE: INTRODUCTION

1.1 Background of Study

Organizations operating both at the local and global platform strongly appreciate the value and contribution of cost of quality on organizational competitiveness, through its influence on final product or service quality and how much this quality impacts customer satisfaction as a significant bearing on overall organizational performance. Saijala, Basak and Viswanadhan (2015) in their study on Hidden Cost of Quality: measurement and analysis, held that Cost of quality are those expenses incurred by an organization in an attempt to achieving and maintaining good quality alongside managing poor quality throughout its line of operations with the aim to attaining highest level of customer satisfaction. They also stated that cost of quality analysis tend to trigger changes and equally provide proof why process changes should be made, holding that focus to improving the financial position of an organization directly correlates with the process of making quality improvements. Gyrna (2001), as cited by Jeffery (2004) observed that companies that have attained competitive levels of quality seek trade-offs in terms of marketability and quality costs, noting the importance of being able to assess all aspects of quality-related costs and finding a balance between quality costs, product competitiveness, and profitability.

Critical in anchoring this research work are study theories as: Juran's Theory of Total Quality Management which is responsible for what has become known as the "Quality Trilogy," which in his Quality Control Handbook (1951,second edition), comprises of quality planning, quality improvement, and quality control. The Theory of Performance which develops and relates six foundational concepts to form a framework that can be used to explain performance as well as performance improvements and Resource Based Theory, which has held by Barney (1991) stipulates the criticality in proper organizational resources allocation and management for effective organizational performance**.**

Kenya National Assembly (2015) listed a total of eleven operational sugar manufacturers in Kenya namely: Chemelil Sugar Limited, Muhoroni Sugar limited, Mumias Sugar Limited, Nzoia South Nyanza Sugar company, Sukari Industries Limited, Transmara Sugar Factory, West Kenya Sugar Factory and Butali Sugar

Factory and Kwale International Sugar Company. Otieno (2015) noted that these sugar manufacturers have largely contributed to the development of the economy, both at the local and national levels, with continued dismal performance resulting into low sugar production hence a deficit in supply to both the local and international demand. Kenya Sugar Board (2011) held that this poor performance of the manufacturers put the livelihoods of more than 250,000 families at risk who are basically small-scale farmers, who largely depend on the sector for their survival. It also stated that lack of productivity growth in the sector have been attributed to several factors such as insufficient supply of sugar cane to millers, cane poaching, capacity underutilization, derailed technological adoption and poor managerial capacities among others.

The organizations have also remained poor in revenue generation following the underperformance, resulting into low processes maintenance levels, with noncompetitive operations efficiencies as reported by the Ministry of Agriculture (2012) Kenya Sugar Strategic Plan, 2010-2014. This has resulted into reported higher production costs which according to the Kenya Sugar Directorate (KSD) ranges at about $ 600 per ton and therefore higher than anywhere else in the (COMESA) region and in Brazil (the leading sugar producer globally) which is at $ 300, about half the Kenya sugar industry cost of production. This current situation is unattainable and has since continued drawing attention to research studies in the sector, in an attempt to finding out the problem areas and offering suggestions for strategic competitiveness.

1.1.1 Cost of Quality

Viswanadhan et al (2015) stated that Cost of quality broadly are the expenses that would be incurred by an organization in achieving and maintaining good quality as well as in managing poor quality throughout its line of operations with an aim to attaining highest level of customer satisfaction. They also held that cost of quality analysis would trigger changes and provide proof why these changes should be made in operations and that the need for improving the financial position of an organization directly correlates with the process of making quality improvements, with Cost of poor quality tending to zero, if all activities are performed well in time. Heinloth (2000) as cited by Jeffery (2004) advocated the return on investment approach to

determining the cost of quality, holding that the effect of quality on profit is equally dependent on the way in which quality affects income or expenses. Cost of quality has been referred to variedly as “the cost due to lack of quality,”“cost of poor quality” and “cost to ensure quality is produced,” by different authors. Crosby (1984) however made two references to try and distinguish the different costs, and he referred to cost of quality as the “price of conformance” and cost of failure as “price of nonconformance”. of quality therefore provide a mechanism for measuring the return on quality (ROQ) for organizations and how these return influence the organization performance. Bemowski (1992) held that the American Society Quality committee (1961) recognized four categories of cost of quality as: prevention cost (PC); appraisal cost (AC); internal failure cost (IFC); and external failure cost (EFC).

1.1.2 Organizational Performance

Barney (2001) stated that organizational performance is rooted on the appreciation that the composition of an organization is through a voluntary association of human resources, productive assets, capital resources and physical resources, for the purpose of accomplishing a common goal. Performance measurement is one of the main ways used in measuring the effectiveness of an organizational management processes. According to Li et al, (2006), the ability of an organization to achieve the financial and strategic objective is usually directly related to its performance. Past researches largely referenced the organization performance with Katou (2008) discussing it with keenness to financial performance only, Stock et al. (2000) discussed it as a measurement of market performance and financial performance factors which included the measures of return on investment (ROI), growth in sales and profits and expansion in market share.

Brah et al, (2000), held that the performance of an organization is usually measured in terms of operational performance, satisfaction of the customer, financial performance and effectiveness of the quality of the product. Birech (2011) outlines various measures of performance as lying within operations area of an organization as follows: Cost of quality which is measured as budgeted cost against actual costs, variances whose measurement is done through standard absorbed costs against actual expenses, periodic expenses which are quantified as budgeted against actual expenses, safety

costs which are weighed on a common scale such as number of accident free hours, and Contributions from Profit whose measurement is done in dollar or through a shared gauge.

1.1.3 Sugar Manufacturing Firm in Kenya

According International Sugar Organization (2016) global sugar trade averages 56 million tons annually and with raw sugar translating to over 60% of international trade volumes. Global consumption of sugar has been expanding at an average of 1.93% annually and this is largely propelled by the rising growth of population, increase in incomes, and shifts in the dietary patterns.

Kenya has eleven operational sugar manufacturing firms as: Chemelil, Muhoroni, Mumias, Nzoia South Nyanza Sugar company, Sukari Industries Limited, Transmara Sugar Factory, West Kenya Sugar Factory and Butali Sugar Factory and Kwale International Sugar Company, Kenya National Assembly (2015).

Kenya Sugar Board (2013), as cited by Otieno (2015) stated that sugar production in Kenya has grown from 389, 138 MT of sugar in 1996 to 600,179 MT in 2013. During the same period, the quantity of sugar consumed increased from 570,000 MT in 1996 to 841,957 MT in 2013 (KSB, 2013). The deficit in meeting domestic sugar consumption needs from local production has grown from 180, 862 MT in 1996 to 241,778 MT in 2013. This has made Kenya to regularly import sugar to meet the domestic demand for sugar consumption.

According to the Kenya Sugar Directorate (2009), locally produced sugar has remained less-competitive with the cost of production at about $ 600 per ton and therefore higher than anywhere else in the COMESA region. The average cost of producing a ton of sugar in Brazil (the leading sugar producer globally) is about $ 300, which is about half the Kenya sugar industry cost of production. This has been attributed to certain critical factors such as insufficient supply of sugar cane to millers, poor industry policy formulation(like unmatched licensing of additional millers against cane availability), cane poaching, capacity underutilization, derailed technological adoption and poor managerial capacities, poor weather conditions not ambient for cane propagation among others.

1.2 Research Problem

Cost of quality has been identified by other researchers as a major consumer of organizations resources. Khozeni et al (2013) in their study on cost of quality and quality optimization in manufacturing, cited Vaxevanidis and Petropoulos (2008) who held that Costs related to Quality represented a considerable amount of a company's total costs and sales, Kent (2005) estimated the total cost of quality standing at 5-15 percent of turnover for organizations in Great Britain, and Crosby (1984) estimated the total cost of quality at 20-35 percent of sales for service and manufacturing organizations in the USA, and Feigenbaum (2001) at about 10 percent of revenues. That the most conservative of these estimates might exceed an organization's net profit highlights the potential importance of cost of quality and organizational performance.

These percentages are significant and therefore worth referencing to the Kenya sugar manufacturers whose performance levels have remained questionable as indicated by the previous research findings. Otieno (2015) Productivity of sugar factories in Kenya, the results suggested that the mean TFP growth index for the period 2004 to 2013 was 0.15%, technical efficiency growth index was 11.48% and technical change index was -5.12%, which showed sugar factories as facing productivity growth problems as TFP growth generally remaining constant. Malonza (2014) Lean Manufacturing and Operational Performance of Mumias Sugar Company limited Kenya concluded that Mumias sugar company ltd did not practice strict adherence to the application of lean management practices and therefore was not realizing its full benefits. Mbithiet, al (2015) Diagnostic Control Systems and Overall Firms Performance of Sugar firms in Western Kenya, the results of this study suggested that urgent measures are required by the firms in the study to design diagnostic control systems to cope with the changing business environment, and many others much more related to governance and management.

It is however clear that no study has been carried out in the Kenya sugar manufacturers on cost of quality recognition and its possible influence to the various organizations' performance alongside the already identified factors as held by other researchers. The researcher out of the referenced existing empirical studies and findings on other manufacturing organizations is made to believe that there could be a

relationship between costs of quality and the perceived dismal performance of the Kenya Sugar manufacturers. How much therefore could be the contribution and the possible relationship between cost of quality and organizational performance that may be generalized to the Kenya sugar manufacturers for continued process improvement?

1.3 Research Objectives

To establish the relationship between cost of quality and organizational performance in the sugar manufacturing firms in Kenya.

1.4 Value of Study

This research study upon conclusion shall have a critical contribution to the already available theories on cost of quality concept especially on how the various COQ dimensions may individually or collectively impact organizational performance through resource allocation, in an attempt to influence product quality, hence customer satisfaction. Management of the sugar manufacturing firms in Kenya upon appreciation of this study finding, may endeavor to audit their processes in respect to COQ concept and its routine influence on performance, with the view to adopting some of the available COQ evaluation models for identifying and measuring the four categories for continuous process improvement decision making as a practice.

The study findings, are significant, and shall draw attention of policy formulators in the sugar manufacturing sector to strategically generate a guide that shall be standard and general to all firms in line to adopting and implementing COQ system as one of the means to evaluating organizational performance.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter provide for a survey of the various theories available on the study area that primarily shall underpin the study, with keenness to the concept variables. It has had a review on the sugar manufacturing firms performance trend issues, that have in one way or another had a contribution to the present observable situation. The chapter have equally reviewed on the summary of knowledge gap in the study area.

2.2Theoretical Foundation

This research study which aimed to appreciate the contribution of the cost of quality concept on organizational performance has largely borrowed from certain key established theories that guided and informed the study, with relevance to the findings.

2.2.1Juran's Theory of Total Quality Management

Juran (1951), as cited by Edgemna et al. (2006) held that there are two definitions of quality: first, is the reference to those features that aim to meet the needs for customer satisfaction, hence its orientation to income. The need for higher quality, in this case, is to provide more customer satisfaction, with the aim of increasing overall income. However, availing more and quality features normally needs investment, thus, leading to increased costs and second, quality implies freedom from deficiencies or errors that lead to redoing the work, customer dissatisfaction, field failures, customer claims, and much more. He also noted that higher quality resulting from product features satisfying customer needs shall enable organizations to: improve customer satisfaction, meet competition, make products saleable, provide sales incomes, increase market share, and secure premium prices, Klefsjo, Bergquist, &Edgeman(2006). On a similar note, high quality emanating from freedom of deficiencies enables firms to: reduce waste, error-rates, warranty charges; customer dissatisfaction, inspection, and increases yields and delivery performance, hence higher quality is less costly.

Juran (1951) as held by Madu,(2012), summarizes the process of quality improvement in his concept called "trilogy:" quality planning, quality control, and quality improvement with: at quality planning, the organization is supposed to set out

quality goals, find out who their customers are, unearth the needs of those customers, come up with products that can meet the needs of their customers, develop processes that can create products that the customers need, and establish process controls. In quality control, the organization has to evaluate actual performance, compare it with quality goals, and act on any deviations. About quality improvement, the firm has to substantiate the need, establish the infrastructure, create project teams, avail resources to the teams to diagnose the causes and stimulate remedies, and develop controls to maintain the gains.

The quality trilogy concept as defined by the quality planning, quality control and quality improvement, are strategically critical to managing quality costs and are targeted at managing, within range organizational resources consumption by the four categories of cost of quality, which if not properly managed may result into considerable resource drain, hence dismal performance. This therefore provide for the foundation upon which the study got anchored.

2.2.2 Theory of Performance

The Theory of Performance as advanced by Elger (n.d) develops and relates six foundational concepts to form a framework that can be used to explain performance as well as performance improvements. These are: to perform, the performer, level of performance, performer's mindset, immersion, and reflective practice. He further held that performance advances through levels that are used to characterize effectiveness of performance as low to higher performance that produces results that can be classified into categories of: Quality increases with results into products being more effective in meeting or exceeding the expectations of stakeholders, cost decreases as the amount of effort or financial resources to produce a desired result going down alongside reduced amounts of waste, capability increases as ability to tackle more challenging performances or projects increases, capacity increases that is ability to generate more throughput increases ,knowledge increases as depth and breadth of knowledge increases and skills increase abilities for increased in breadth of application and effectiveness. The theory through its appreciation of the particular performance outcomes as quality increase and reduced costs of production as a means to evaluating performance of an organization strategically anchors this study that aimed to establish the possible influence of cost of quality on the sugar firms' performance.

2.2.3Resource Based View Theory

This theory identifies two assumptions: first according Barney (1991),is that the differences amongst firms within an industry are grouped according to the resources they possess and control, which a focus on an organization's resource diversity. Secondly, he stated that resources are relatively stable across different organizations and such diversity can be persistent. This assumption focuses on the immobility of organization's resources. The main focus of this theory is on the resources and the capabilities controlled by an organization that explains the persistent differences in performance amongst organizations Peteraf & Barney,(2003). Barney (1991) further stated that organizational resources are its assets and strengths and the information items it controls, enables it to strategize and execute mechanism which overally improve its efficiency. The organizational resources are believed to be the vital sources for creating and maintaining competitive advantage, provided they the possess the value, for exploiting available opportunities or neutralize threats from competitors. The resources must also be rarely available among the firms' competitors and also render little chances for duplication and must also have substitutes. Proper strategic allocation and management of organizational resources is critical for successful organizations. How much resource is allocated in managing the cost of quality must therefore be measured and matched with the need, which is a provision of this theory, hence through careful identification and evaluation of each COQ category for meaningful resource allocation would be critical for growth prospects.

2.3 Cost of Quality Dimensions

Juran (1951) as cited by Khozein et al (2013) stated that the concept of Cost of Quality (COQ) has been in existence over the past several years. In 1961 American Society for Quality (ASQ) created the Committee for managing Quality Cost under the Quality Management Division. However the use of COQ was later on popularized by Crosby B. Philip through inclusion in his book, Quality is Free (1979) in which he proposed several systems for upholding quality standards asAS-9000, ISO 9000, QS-9000, as a point of reference to the use of COQ for improving quality in organizations.

The American Society for Quality's (ASQ) which is a committee for evaluating Quality Cost was created in 1961 and its main mandate was formalization of the concept of cost of quality and promotion of its use in organizations, Bottorff (1997). According to Bemowski (1992) ASQ recognized four categories of costs of quality as: Internal Failure Costs (IFC), External Failure Costs (EFC), Appraisal Costs (AC) and Prevention Costs (PC). These classifications have been wholly accepted by different professions including the accounting and quality; as a result they are also used as part of international standards. Nevertheless, in various organizations the cost of quality has never been treated independently and calculated explicitly but is usually included as part of the whole product realization cost, Shepherd (2001).

Prevention costs according to Wang and Cheng (2009) are those that are incurred to prevent quality problems. They are planned and incurred before executing the actual operations. They usually concern the design and implementation of systems for managing quality as well as their maintenance and may include: Specification for the Products or services which involve establishing conditions for the supplies processes and activities, end products and services; Planning for Quality which involves establishment of quality plans, operations reliability, inspection, production, quality control and assurance which is concerned with formation and maintenance of quality systems and Preparation, training, development and maintenance of quality programs.

Appraisal cost as held by Wang and Cheng (2009), are those that are concerned with evaluation and monitoring quality and the activities related to it. These costs are related to supplies and customer's assessment of their purchases, products, processes, and services to guarantee that they are in conformance with the requirements. These include: Supplier rating which concerns the evaluation and approvals of suppliers of products and services; verification which involves examination of supplies, processes, setups, and products versus the acceptable requirements; quality audits which confirm the functionalities of the quality systems.

Internal failure costs include faults occurring at different stages before delivering the product to the customer, such as testing and inspection by quality cost staff or external auditors to trace and take corrective measures against the fault, Farsijani and Kyamhr (2008). These costs are usually incurred due to failure of work to achieve

design standards for quality and they get detected prior to passing them over to the client. These include: Scrap, which is a faulty product that can never be used or sold; waste as a result of committing errors or performing needless work or holding of stock due to poor communication or poor organization; rework and lack of proper failure analysis mechanisms.

External failure costs as held by Gary (2000) are those that eventually disappear if flaws are not found in the product after its shipment to the client. They include customer complaints processing, handling of return inwards, claims made on warranties and costs incurred in repairs, liabilities and recalls of the products. They are costs sustained to remedy flaws identified by clients. Such costs are usually incurred when clients detect products or services that have not conformed to the quality standards after shipment and include: claims made on warranties for replacement or repairs under guarantees; repairing and servicing activities done on the products returned and those in the field; complaints from customers and all associated costs of handling and servicing them; returns' handling and investigating the recalled or rejected products, as well as the transportation costs.

Sower et al. (2007) examined the relationship exiting between quality cost distribution and the maturity level of an organization's quality system in order to assess the impact that effective COQ systems and maturing quality systems have on the performance of organizations, and identify reasons as to why utilization of COQ systems lack in some organizations. The costs resulting from external failures were found to decline as a percentage of total cost of quality (COQ) as an organization's with respect to increase in quality system maturity. It was also established that the total COQ increased as an organizations moved from lower levels to higher levels of quality system maturity. However Sales and profit growth did not have a significant correlation with the availability of a quality cost systems or with the increase in level of maturity of the quality system. Inadequate support from the management was also am major reason why organizations fail to track quality costs.

2.4 Cost of Quality and Organization Performance

San (2000) held that with the rise in cost of operating businesses as a result of globalization, which is one of the key trends in the different business environments today and as global competition also continues to grow rigorously; organizations will eventually find it challenging to compete on price related issues as an absolute element. They therefore will have to uphold their competitiveness on costs and guarantee that their products and services quality meet the expectations of their customers, with cost of quality offering a mechanism for evaluating the return on quality (ROQ) in organizations, and the impact this benefit has on the business objectives. Cost of quality also serves as a valuable platform that helps to reduce business cost and increase organizational competitiveness. However, organizations do not have adequate knowledge regarding cost of quality and as a consequence never evaluate these costs categories, Krishnan (2006).

According to Saijala et al (2015)Hidden cost of quality: measurement and analysis, cost of quality are broadly the expenses an organization incurs while trying to achieve and maintain good quality and also controlling poor quality along its operational line with intention of achieving highest level of customer satisfaction. Poor quality costs usually are reduced to bare minimum (zero) when all activities are conducted properly, Crosby (1984).

Harrington (1999) held that measuring cost of quality enables one to control it, and without its evaluation, the information which is relevant for making decisions will be hidden. Harrington(1987); Gryna (1999); Sörqvist (2001) and Krishnan (2006)outlined the significance for measuring and converting COQ into fiscal terms so as to bridge the gap existing between the top management and the quality department mainly because COQ accounts for between 10- 40% of the organization's turnovers which as a direct relationship with profitability. When the overall size of the COQ is presented and quantification is done in monetary terms, there is likelihood that the issues will be addressed by the top management faster and appropriate course be determined immediately, Krishnan (2006). According to Feigenbaum (1991) COQ creates a shared economic platform which enables clearer and effective communication and

where quality enhancement investments can be appraised in relation to other enhancements including profits.

The benefits realized by employing systems for managing cost of quality are: they act as assessment techniques for the general effectiveness of quality programs; act as techniques for determining and defining problem areas and prioritization of actions; acts means for measuring return on investment; they are also critical in the conversion of the numerous performance indicators used by organizations and valued as a method for quantifying qualitative improvements. Cost of quality functions increase preventive activities that help to eradicate external and internal failures and also to decrease evaluation activities. The practice of reducing the COQ should be an integral part of continuous processes improvement on quality within the organization through TQMP program. Juran (1951) stated that quality cost analysis, is amongst some of the most effective tools for collecting and analyzing expenses incurred in upholding quality in a manufacturing process. It helps to identify the valueless added expenses.

2.5 Summary of the Knowledge Gap

Even though a number of studies have already been conducted in the sugar manufacturing firms in Kenya driven by the firms' valuable contribution to the general economy, and considering their present level of performance, there appear to be knowledge gap that would impact the consumption of the findings. Otieno (2015) Productivity of sugar factories in Kenya, held that the manufacturers productivity growth remained low at a TFP of 0.15% between the year 2004-2014, referencing the general firms' negating factors. Malonza (2014) Lean Manufacturing and Operational Performance of Mumias sugar company limited Kenya, this study concluded that the organization have not adopted the application of lean manufacturing in totality, but failed to provide the causes for not doing so and how the same may get applied to the rest of the firms. Mbithi et, al (2015) Diagnostic Control Systems and Overall Firms Performance of Sugar firms in Western Kenya, the findings aim at improved efficiencies and process quality improvement, but fail to address the readiness for the technology adoption by the firms. Owiye (2016) Effect of Trade Liberalization on Performance of the sugar firms in Kenya, Mbalwa et al. (2014) Effect of corporate Governance on performance of sugar firms in Kenya among others.

These studies in one way or the other tend to answer sugar manufacturing processes quality issues but in totality ignore the cost of quality element, which the researcher believed to be significant for recognition for the consumption of the other research findings. Manufacturing processes are all designed to deliver some level of product quality for customer satisfaction, which is at a cost, hence the need to appreciate the concept of cost of quality and its possible influence on performance.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This section provided for the nature of the research design, the population of the organizations of the sugar manufacturers surveyed, population sample design, data collection means and analysis appropriate for the study.

3.2 Research Design

The research work employed descriptive cross-sectional survey as the most suited research design, which Olsen and Marie (2004), held as being a type of observational study that analyzes data collected from either the entire population, or a representative subset, at a specific point in time, for data collection and analysis to help answer the research questions of interest. It is useful in examining one variable in different groups that are similar in all other characteristics as for the case of sugar manufacturing firms in the Kenya, it is not costly, useful in approving or disapproving assumptions and its findings and outcome are analyzable creation of new theories or studies for in-depth research. This justified the appropriateness of the methodology for the study.

3.3 The Population

The research study drew its population from the eleven operational sugar manufacturing firms in the Kenya, as listed and attached under appendix1.

3.4 Data Collection

This research work majorly employed the use of secondary data, which was obtained through administration of structured questionnaire by the researcher. Targeted participants were senior managers of the organizations as: Procurement Manager, Production Manager, Quality Control Manager, Maintenance Manager and Management Accountant from the respective firms.

The questionnaire had two parts. Part A provided for the cost of quality categories recognition data collection, Part B organizational cost of quality actual expenditures and Part C, organizational performance as underproduction, sales and profitability figures.

3.5 Data Analysis

The study data are quantitative, hence statistical data analysis method consumption, especially the exploratory data analysis, which provided for establishment of the

variables relationships. Part A observed the application of correlation analysis and Part B and C having regression analysis being employed as the most appropriate statistical data analysis method. The research work had four categories of COQ as independent variables as predictors and organizational performance, as the dependent variable. This therefore demanded for the use of multiple regression analysis model, with the regression model formula appearing as below:

$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4$

The elements of the above multiple regression equation are as:

Y Organizational performance as the dependent variable

a (Alpha) is the Constant or intercept, when value of Y is as expected

b_1 the Slope (Beta coefficient) for X_1

X_1, Prevention Cost variable (Cost of Quality category independent variable)

b_2 the Slope (Beta coefficient) for X_2

X_2 Appraisal Cost (Cost of Quality category independent variable)

b_3 the Slope (Beta coefficient) for X_3

X_3 Internal Failure Cost (Cost of Quality category independent variable)

b_4 is the slope (Beta coefficient) for X_4

X_4 External Failure Cost (Cost of Quality category independent variable)

CHAPTER FOUR: DATA ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction

This chapter provided for the general findings on the cost of quality categories' activities relationships as between Prevention Cost Activities (PCA), Prevention Cost Expenditure (PCE), Appraisal Cost Activities (ACA), Appraisal Cost Expenditure (ACE), Internal Failure Cost Activities (IFCA), Internal Failure Cost Expenditure (IFCE), External Failure Cost Activities (EFCA) and External Failure Cost Expenditure (EFCE). It presents both the ANOVA and Regression analysis results.

4.1.1 Response Rate

A total of 30 copies of the research questionnaire were administered to the various sugar manufacturing firms in Kenya by the researcher with the objective of collecting the desired data as a means to answering the research objectives. A positive response was observed with 22 answered copies realized for analysis. This translated to 73% response rate, and together with the secondary data from KSD was significant and provided a wider scope for data retrieval and analysis.

4.2. Cost of Quality Activities

These are activities that are resultant of the four cost of quality categories as: prevention cost (PC), appraisal cost (AC), internal failure cost (IFC) and external failure cost (EFC). Each of these categories generally attracts a level of activity that define its cost contribution and by extension expenditure from the organization as: prevention cost expenditure (PCE), appraisal cost expenditure (ACE), internal failure cost expenditure (IFCE) and external failure cost expenditure (EFCE).

4.2.1 Prevention Cost Activities

Prevention Cost Activities (PCA) extent of recognition scores by the various sugar manufacturers in Kenya, would be an indicator of the level of preventive maintenance measures aimed at containing process failures and could also indicate the levels of both internal and external failures. Table 1 below shows the findings.

Table 1: Prevention Cost Activities

Prevention cost activities	Mean	Std. Deviation
PCA1	4.09	.701
PCA2	4.27	.786
PCA3	4.27	.467
PCA4	4.27	.786
PCA5	4.45	.522
PCA6	3.91	1.221

Source: Author 2017

The findings showed a general strong extent of recognition by the sugar manufacturers on prevention cost activities, with a higher mean score of 4.45 , with relatively low standard deviation, indicating the importance of preventive activities in the efficient operations of the processes. The lowest mean of 3.91 with a standard deviation of 1.221 is a show of little recognition of the PCA. Proper observation of the PCAs' is aimed at delivering longer plant availability and efficient production.

4.2.2 Appraisal Cost Activities

Appraisal cost activities (ACA) emphasizes the need for having the right process monitoring tools in ensuring quality product realization. It was therefore important to gauge the extent to which the various firms perceived the same, with the findings as held in table 2 below.

Table 2: Appraisal Cost Activities

Appraisal cost activities	Mean	Std. Deviation
ACA1	3.45	.820
ACA2	4.18	.751
ACA3	4.18	.982
ACA4	4.82	.405
ACA5	3.91	.944

Source: Author 2017

Observation of appraisal cost activities is key to all the sugar manufacturers under quality assurance and for continued customer loyalty. This is the justification as provided in table 2, with a highest mean of 4.82 out of the possible mean of 5, with a standard deviation of .405, which is a show of fair compliance to process quality standards.

4.2.3 Internal Failure Cost Activities

Internal failure cost activities (IFCA) generally would result into higher cost of production hence, the extent to which the sugar manufacturers recognized the cost was of interest with the findings as contained in table 3 below.

Table 3: Internal Failure Cost Activities

Internal failure cost activities	Mean	Std. Deviation
IFCA1	2.27	1.009
IFCA2	2.55	1.293
IFCA3	2.64	1.362
IFCA4	3.18	.405
IFCA5	2.45	1.508

Source: Author 2017

The highest IFCA recognition score was 5 and therefore a highest mean score of 3.18 is relatively low, which translates to poor observation of IFCA. This is likely to result into high costs of production as a result of rework activities and poor process efficiencies and confirms the KSD (2009) report on the manufacturers marginal performance with a production cost of as high as $ 600 per tonne of sugar produced. The lowest mean score of 2.27 and a standard deviation of 1.009 further suggest non compliance to set standard operating procedures.

4.2.4 External Failure Cost Activities

The external failure cost activities (EFCA) would generally occur if product failures are not timely identified before the product reaches the customer and would automatically attract reasonable cost, as carriage inwards and scrap disposal, which

must be avoided or kept at minimum levels. It was therefore important to find out the extent as scored by the sugar manufacturers with the findings as in table 4.

Table 4: External Failure Cost Activities

External failure cost activities	Mean	Std. Deviation
EFCA1	3.27	1.009
EFCA2	3.64	1.027
EFCA3	3.45	.820
EFCA4	3.55	.820
EFCA5	3.55	.820

Source: Author 2017

All the organizations showed relatively high recognition of the EFCAs'; with a highest mean score of 3.64 and a lowest 3.27. Properly managed internal processes, have translated to fairly low levels of the external failure cost activities for controlled costs and sustained customer satisfaction.

4.3 Cost of Quality Categories Expenditures

These are expenditures which the sugar manufacturers would routinely would incur while managing the cost of quality categories activities as: prevention cost activity (PCA), appraisal cost activity (APCA), internal failure cost activity (IFCA) and external failure cost activity (EFCA)

4.3.1 Prevention Costs

This part provide finding of the researcher on the expenditure levels scored by the sugar manufacturers in Kenya on prevention cost activities in an attempt to deliver quality product at manageable costs, as contained in table 5 below.

Table 5: Prevention Costs

Prevention costs	Mean	Std. Deviation
PC1	1.82	.603
PC2	1.73	.905
PC3	1.82	.874
PC4	1.55	.522
PC5	1.73	.905

Source: Author 2017

The low mean score as in table 5 shows very low recognition for prevention costs, with the likely hood of compromised production efficiencies, given the lowest level of resource allocation. Poor recognition of these activities has got the end result of higher eventual maintenance expenditures, as it is with their annual maintenance budget. The mean scores are much closer with a fair spread in standard deviation across all the firms.

4.3.2 Appraisal Costs

These are costs that would be incurred on activities relating to process monitoring, supplier pre-qualification and supervision. Therefore it was important to alongside finding out the extent of the appraisal costs recognition, the researcher equally tried to find out the equivalent cost expenditure as incurred by the organizations, with findings provided in table 6.

Table 6: Appraisal Costs

Appraisal costs	Mean	Std. Deviation
AC1	1.36	.505
AC2	1.73	.647
AC3	1.73	.905
AC4	1.45	.688
AC5	1.45	.688

Source : Author 2017

The finding as provided in the table 6 above give an indication of a fairly low financial expenditure that followed the recognition of the appraisal cost category as supported by the highest mean score of as low as1.73 and lowest 1.36 against a possible mean of 5, with fairly low standard deviation of as low as 0.505. this is not commensurate to the mean score on the appraisal activities of up to 4.82, implying compromised resource allocation to managing the activities.

4.3.3 Internal Failure Costs

The Table 7 below provide the finding by the researcher on the level of expenditure scored by the sugar manufacturers with respect to managing the identified internal failure cost s(IFCAs)' with focus to realizing a competitive final product. These costs

are mainly incurred at the point the work in process shows a non-conformance from the specification, with a call for a rework or absolute defective product scraping.

Table 7: Internal Failure Costs

Internal Failure Costs	Mean	Std. Deviation
IFC1	1.73	.647
IFC2	1.27	.467
IFC3	1.27	.647

Source: Author 2017

It is shown as in the table that the organizations incurred expenditures following appreciable recognition of the cost of quality category as evident in the mean scores with fairly low standard deviation. The mean scores are fairly low indicating that the IFCAs' did not attract so much resource consumption.

4.3.4 External Failure Costs

This part provided for the finding of the researcher on what level of expenditure the sugar manufacturers recognized in answering to the processes external failure costs (EFC), relating to the internal failure cost activities (EFCAs'). These costs relate to customer complaint, return inward expenses, and scrap disposal. The findings of which are contained in table 8 below.

Table 8: External Failure Costs

Internal failure costs	Mean	Std. Deviation
EFC1	1.36	.674
EFC2	1.45	.688
EFC3	1.64	.674

Source : Author 2017

The resultant recognition of the external failure cost activities and the push to contain the contributing factors has shown to bear positive results as seen from the relatively low expenditure levels across all the organization, with a uniform low standard deviations. It could also imply low cases of final product failures, with subsequent higher customer satisfaction.

4.4 Cost of Quality Activities and Cost of Quality Expenditure Relationships

Pearson correlation coefficient (PCC), also referred to as Pearson's *r*, Pearson product-moment correlation coefficient (PPMCC), which is a measure of linear correlation between two variables *X* and *Y*. It has a value between +1 and −1, where 1 is total positive linear correlation, 0 is no linear correlation, with −1 showing strong negative linear correlation.This section examined the nature of the relationships that possibly exist between the cost of quality category activity and the equivalent level of expenditure so as to influence the performance of the organizations.

4.4.1Prevention Cost Activity and Prevention Cost Expenditure Relationships

It would be expected that a given level of prevention cost activity (PCA) during operations would equally attract prevention cost expenditure (PCE), essential to gain a financial recognition. Higher PCEs' is expected to draw its attention to production processes appraisal and to evaluate the quality of the various prevention cost activities.

Table 9: Prevention Cost Activity and Prevention Cost Expenditure

	PCE1	PCE2	PCE3	PCE4	PCE5
PCA1	.043	.201	.030	.124	-.273
PCA2	.326	-.166	.079	.089	-.447
PCA3	-.161	.430	.379	.149	.194
PCA4	.326	-.166	-.066	.089	-.588
PCA5	.289	-.135	-.020	.100	-.558
PCA6	.111	-.568	-.486	-.228	-.115

Source : Author 2017

It is evident that the prevention cost activities from PCA1 to PCA6 show a fairly weaker linear correlation against PCE1 to PCE5 with almost all the r values tending to zero. The strong negative values as -.588, -.558, -.568 show negative correlation, implying that an increase or decrease in the PCA would result into a decrease and increase in PCE respectively. The interpretation here is that not all and always will the

PCAs' attract significant expenditures, especially for online prevention measures. The relationship is far much weak with PCA4 and PCE5 with -.588.

4.4.2 Prevention Cost Activity and Appraisal Cost Expenditure

Preventive cost activities would have a bearing on the other and more so in situations where there is an increasing need for PCA, then it will be critical to appraise the system that would be at a certain cost. Appraisal cost expenditure if properly directed is supposed to inform the specific prevention activity needs.

Table 10: Prevention Cost Activity and Appraisal Cost Expenditure

	ACE1	ACE2	ACE3	ACE4	ACE5
PCA1	.180	.060	.359	-.094	.736**
PCA2	-.023	-.232	-.166	-.252	-.067
PCA3	-.463	.271	-.280	.510	.198
PCA4	.229	-.232	.115	-.437	.303
PCA5	.069	-.188	-.135	-.354	.203
PCA6	.384	-.288	-.025	-.541	-.541

Source : Author 2017

It is shown that there is a strong linear correlation between PCA1 and ACE5 at .736, PCA3 and ACE4 at r = 0.510, with a moderate correlation between PCA6 and ACE1 at 0.384, those at negative values indication negative linear correlation between the variables, implying that a rise or a decrease in one variable attracting an opposite move on the other variable.

4.4.3 Prevention Cost Activity and Internal Failure Cost Expenditure

Preventive cost activities (PCA) would generally aim at contained internal failure cost expenditures (IFCE), if precisely carried out under properly structured maintenance programs, with clear intention of controlling the IFCEs'. Higher IFCEs' has got the net effect of escalated costs of production.

Table 11: Prevention Cost Activity and Internal Failure Cost Expenditure

	IFCE1	IFCE2	IFCE3
PCA1	.502	-.389	-.060
PCA2	-.036	.050	.232
PCA3	-.391	1.000**	-.271
PCA4	.358	-.495	.232
PCA5	.108	-.149	.188
PCA6	.092	-.829**	.288

Source: Author 2017

There is evidence of very strong or perfect linear correlation between PCA3 and IFCE2 at r = 1.00, implying that an increase in prevention cost activity 3 attracts an equivalent increase in internal failure cost expenditure 2 and vice versa. Other variables as PCA1 and IFCE1 with r = .502 shows a moderate linear correlation. PCA6 and IFCE2 indicate a very strong negative correlation.

4.4.4 Prevention Cost Activity and External Failure Cost Expenditure

Higher IFCEs' would imply the need for more intensive prevention cost activities, to majorly contain customer complaint and return inward and scrap disposal expenditures to manage overall production costs. Higher EFCE could also imply compromised prevention cost activities leading to compromised final product quality.

Table 12: Prevention Cost Activity and External Failure Cost Expenditure

	EFCE1	EFCE2	EFCE3
PCA1	.558	-.094	.289
PCA2	.171	-.252	-.360
PCA3	.289	-.113	-.289
PCA4	.360	-.252	.017
PCA5	.336	-.354	-.052
PCA6	-.563	.054	.320

Source : Author 2017

Prevention cost activity 1 shows a fairly moderate linear correlation with external

failure cost expenditure 1 at r = 0.558, there is however fairly weaker relationships between PCA 3, 4, 5 and EFCE 1 at r = .289, .360 and .336, with those at negative r values showing negative linear correlation between the variables.

4.4.5 Appraisal Cost Activity and Appraisal Cost Expenditure

The level of expenditure that would be recognized by any organization would depend on the level of appraisal cost activity along the process line.

Table 13: Appraisal Cost Activity and Appraisal Cost Expenditure

	ACE1	ACE2	ACE3	ACE4	ACE5
ACA1	.286	-.120	.184	-.403	.484
ACA2	.336	-.300	.080	-.564	.018
ACA3	.257	-.387	.174	-.431	-.283
ACA4	-.134	-.209	-.149	-.033	-.392
ACA5	.286	-.372	-.032	-.546	-.392

Source : Author 2017

*. Correlation is significant at the 0.05 level (2-tailed).

It is evident that increased or decreased levels of ACAs' will have linear correlation with the ACEs' following the over ally low r values tending to zero. ACA1 and ACE5 with r = .484 however unique with a moderate linear correlation direct influence on the ACEs', implying that most of the appraisal activities are routine with significant financial implications.

4.4.6 Appraisal Cost Activity and Internal Failure Cost Expenditure

Recognizable internal failure cost expenditures (IFCE) in the process would generally attract enough appraisal cost activities (ACA), to help control the expenditures. Appraisal cost activities are aimed at systems monitoring and evaluation to ensure final product compliance at controlled costs.

Table 14: Appraisal Cost Activity and Internal Failure Cost Expenditure

	IFCE1	IFCE2	IFCE3
ACA1	.446	-.617*	.120
ACA2	.318	-.726*	.300
ACA3	.243	-.555	.387
ACA4	-.209	.289	.209
ACA5	.119	-.619*	.372

Source : Author 2017

There is enough evidence from the table that there is very strong negative correlation between the variables ACA1 and IFCE2, ACA2 and IFCE2, ACA5 and IFCE2 at r = -.617, -.726 and -.619, an increase in one implies a decrease in the other. The other variables showing general weak linear correlations.

4.4.7 Appraisal Cost Activity and External Failure Cost Expenditure

External failure cost expenditures are as a result of internal process failures and hence the need for appraisal activities to a certain areas of failure and to contain the same before final product reaching the customer for eventual rejection, hence the subsequent rise in EFCE levels.

Table 15: Appraisal Cost Activity and External Failure Cost Expenditure

	EFCE1	EFCE2	EFCE3
ACA1	.395	-.226	.329
ACA2	.054	-.176	.144
ACA3	-.110	.013	-.343
ACA4	-.100	-.033	-.633*
ACA5	-.257	-.084	-.057

Source : Author 2017

Intense appraisal cost activities are not strongly influenced by the external failure cost expenditures as shown by the general weak correlation, except for ACA4 and EFCE3 at r = -.633 showing a strong negative linear correlation. This could indicate neglect in

reporting the EFCEs' for a reactive appraisal cost activities, with eventual under quoted production costs.

4.4.8 Internal Failure Cost Activity and Prevention Cost

Internal failure cost activities are incurred when processes realize a malfunction, hence the call for a given level of prevention measure that triggers a given cost implication. Proper and effective prevention resource allocation and utilization would considerably contain IFCA, which equally attract cost.

Table 16: Internal Failure Cost Activity and Prevention Cost

	PC1	PC2	PC3	PC4	PC5
IFCA1	-.239	.418	.289	.069	.418
IFCA2	-.245	.482	.362	.108	.396
IFCA3	-.210	.317	.275	.026	.480
IFCA4	.149	-.124	.103	-.043	.149
IFCA5	-.010	.173	.221	.035	.247

Source : Author 2017

All the IFCAs' show fairly low linear correlation with PC2s' to PC5s, with a high of r = .480 for IFCA 3 and PC5, the IFCAs' shows very weak negative correlation with PC1s'. This could imply low internal process failures that would attract major prevention costs. Also may imply strong maintenance programs in a number of organizations.

4.4.9 Internal Failure Cost Activity and Appraisal Cost Expenditure

Internal failure cost activities get informed by the resultant appraisal expenditures that will tend to indicate extent of internal failures. This attracts cost that must be evaluated and contained through best process practices.

Table 17: Internal Failure Cost Activity and Activity Cost Expenditure

	ACE1	ACE2	ACE3	ACE4	ACE5
IFCA1	-.214	.279	.199	.524	.236
IFCA2	-.334	.315	.054	.593	.256
IFCA3	-.225	.217	.155	.515	-.019
IFCA4	.134	-.174	.422	.033	-.327
IFCA5	.024	.037	.467	.263	.070

Source : Author 2017

There is a clear linear correlation between the IFCAs' and ACE3s' and ACE4s', with a high of r = .524 for IFCA 1 and ACE4, this indicates the need for more attention on ACE to manage the IFCA for efficient process management.

4.4.10 Internal Failure Cost Activity and Internal Failure Cost Expenditure

It would expected that as the internal failure cost activities increase or decrease, so shall the IFCEs', this follows the reasoning that increased internal cost expenditure are as a result of huge internal failure cost activities, with the resultant rise in process costs.

Table 18: Internal Failure Cost Activity and Internal Failure Cost Expenditure

	IFCE1	IFCE2	IFCE3
IFCA1	-.028	.463	-.279
IFCA2	-.163	.722*	-.315
IFCA3	-.124	.486	-.217
IFCA4	.209	-.289	.174
IFCA5	.242	-.052	-.037

Source : Author 2017

There is strong linear relationship between IFCA2 and IFCE 2 at r = .722, the of the variables do not show a clear relationship. Proper attention on the IFCA will linearly determine how effective the IFCE levels are controlled and managed.

4.4.11Internal Failure Cost Activity and External Failure Cost Expenditure

Proper internal failure cost activities (IFCA) is expected to generally result into lower external failure cost expenditures, for controlled production cost. This is more so when they are accurately administered to the process failure points of need.

Table 19: Internal Failure Cost Activity and External Failure Cost Expenditure

	EFCE1	EFCE2	EFCE3
IFCA1	.134	.236	-.134
IFCA2	.209	.143	-.209
IFCA3	-.059	.301	-.267
IFCA4	-.267	.392	-.467
IFCA5	.018	.360	-.313

Source : Author 2017

It is evident from the above information that internal failure cost activities IFCA1 to IFCA5 present fairly weaker linear correlation with the external failure cost expenditures EFCEs' ranging from .392 to .143, implying that a slight rise or fall in internal failure cost activities would attract an equivalent external failure cost expenditure. On the other hand there appear to be a general negative correlation with the EFC1s' and EFCE3s'.

4.4.12 External Failure Cost Activity and External Failure Cost Expenditure

It would be expected that increased or decreased external failure cost activities would attract an en equivalent amount of expenditure. Higher EFCAs' imply higher final

product non conformance, hence higher expenditures on managing the resultant activities and vice versa.

Table 20: External Failure Cost Activity and Prevention Cost Expenditure

	PCE1	PCE2	PCE3	PCE4	PCE5
EFCA1	.254	-.020	.175	.069	-.129
EFCA2	.367	-.225	.030	.034	-.333
EFCA3	.184	.049	.266	.064	.049
EFCA4	.018	-.049	.152	-.064	.355
EFCA5	.018	-.049	.152	-.064	.355

Source : Author 2017

Having adequate allocation on PCE in the production line shall have an end result of contained EFCA levels for controlled production costs, this supported by the relationship presented by the EFCAs' and PCE1s' and PCE3s'.

4.4.13 External Failure Cost Activity and Appraisal Cost Expenditure

External failure cost activity (EFCA) are a show of process failures , which demand for appraisal cost expenditure to establish the causes of failure for appropriate corrective action, which naturally attract an expenditure.

Table 21: External Failure Cost Activity and Appraisal Cost Expenditure

	ACE1	ACE2	ACE3	ACE4	ACE5
EFCA1	.179	-.181	.528	-.052	.092
EFCA2	.281	-.315	.421	-.309	-.026
EFCA3	.044	-.120	.453	.129	-.048
EFCA4	-.044	-.069	.221	.226	-.484
EFCA5	-.044	-.069	.221	.226	-.484

Source: Author 2017

Proper process appraisal cost expenditure shall ensure reduced EFCA, with fairly controlled running costs, for competitiveness. EFCAs' show a general linear correlation with the ACEs' with r value ranging from r = .528 to .221. EFCA4 and EFCA5 and ACE5 showing relatively moderate negative correlation at r = .484

4.4.14 External Failure Cost Activity and Internal Failure Cost Expenditure

Increased internal failure cost expenditures would imply increased EFCAs' as there would be an open hitch in the processes, including answering to the customer claims and waste handling, with increased higher EFCAs'.

Table 22: External Failure Cost Activity and Internal Failure Cost Expenditure

	IFCE1	IFCE2	IFCE3
EFCA1	.432	-.386	.181
EFCA2	.438	-.606*	.315
EFCA3	.257	-.095	.120
EFCA4	-.069	.095	.069
EFCA5	-.069	.095	.069

Source : Author 2017

Higher IFCE levels would mean controlled EFCA as most product defects are likely to be contained before reaching the customer for consumption, this shown by the moderate correlation at r =.438 for EFCA2 and IFCE1. Those with the negative values are indicators of negative linear correlations.

4.4.15 External Failure Cost Activity and External Failure Cost Expenditure

Increased or decreased external failure cost activities (EFCA) would generally bear equivalent external failure cost expenditures (EFCE).

Table 23: External Failure Cost Activity and External Failure Cost Expenditure

	EFCE1	EFCE2	EFCE3
EFCA1	.134	.236	-.428
EFCA2	.066	.116	-.355
EFCA3	.033	.306	-.575
EFCA4	-.395	.403	-.510
EFCA5	-.395	.403	-.510

Source : Author 2017

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Process failures resulting into defective products will raise the levels of EFCA, hence arise in the EFCE's, with resultant non competitive production costs, hence a linear relationship as indicated with the EFCE2s' and EFCAs'.

4.5 Analysis Of Variance (ANOVA)

Analysis of Variance (ANOVA) is a statistical method used to test differences between two or more means, and more applicable for testing the general differences in the means. The two-way analysis of variance (ANOVA) has been applied and examines the influence of two different categorical independent variables as PCE, ACE, IFC and EFC on one continuous dependent variable, organizational performance. The two-way ANOVA not only aims at assessing the main effect of each independent variable but also if there is any interaction between them.

Table 24: ANOVA Results

ANOVA		Sum of Squares	Df	Mean Square	F	Sig.
PCE	Regression	8.802	6	1.467	54.768	.001
	Residual	.107	4	.027		
	Total	8.909	10			
ACE	Regression	9.170	6	1.528	6.041	.052
	Residual	1.012	4	.253		
	Total	10.182	10			
IFCE	Regression	6.286	6	1.048	2.444	.203
	Residual	1.714	4	.429		
	Total	8.000	10			
EFCE	Regression	8.611	6	1.435	19.290	.006
	Residual	.298	4	.074		
	Total	8.909	10			

Source : Author 2017

The study adopted The Scheffe procedure, a method used in adjusting significant levels in a linear regression analysis in accounting for multiple comparisons, which was performed at the 0.05 level of significance. From the above results it is evident that prevention cost expenditure, **PCE** has a ($p = 0.001$), here the p value is far less than the 0.05 significance level, which is an indicator of strong evidence against the imagined relationship between cost of quality and organizational performance in the Kenya sugar manufacturing firms. Appraisal cost expenditure, **ACE** has a ($p = 0.052$), which is close to the 0.05 significance level and will give a fairly stronger evidence against the relationship in question. **IFCE** has a ($p = 0.203$),this value of p is greater than the 0.05 significance level, an indicator of weak evidence against the relationship under study and for **EFCE** with a ($p = 0.006$), the p value is far less than the significance level, hence a stronger evidence against the relationship under research. The results show that a general statistical significance and evidence exit with the results posted as with the cost of quality categories expenditures strongly indicating likely hood of influence on organizational performance. with a clear linear relationships between the cost of quality categories and the expenditures , hence the proven value of the study in answering the research objectives.

4.6 Regression Results Interpretations

This section presents the regression results on relationship between COQ categories expenditures which could be used appreciate their possible influence in the performance of sugar manufacturers in Kenya. Table 26 below shows the findings.

Table 25: Regression Results

Regression results	R	R^2	Adjusted R^2	Std. Error of the Estimate
PCE	.994[a]	.988	.970	.164
ACE	.949[a]	.901	.752	.503
IFCE	.886[a]	.786	.464	.655
EFCE	.983[a]	.967	.916	.273

Source : Author 2017

The value of R represents the multiple correlation coefficients which measure the quality of the prediction of the dependent variable. From table 25 above it is evident that the R = 0.994 for PCE which shows a strong level of prediction. The R^2 which is the coefficient of determination for PCE is R^2 = 0.970 indicating 97% and the other 3% is not explained and this imply that COQ category affects PCE of sugar manufacturers.

From table 25 above it is also evident that the R value for ACE is R = 0.949, which shows a strong level of prediction. The R^2 which is the coefficient of determination for ACE is R^2 = 0.752 indicating 75.2% and the other 24.8% is not explained and this imply that COQ affects ACE of sugar manufacturing firms in Kenya.

It is also evident from table 25 above illustrates that the R value for EFCE is R = 0.983, which is a shows of strong level of prediction. The R^2 which is the coefficient of determination for R^2 = 0.916 indicating 91.6% and the other 8.4% is not explained and is an equally stronger level of prediction, implying that COQ category activities affects EFCE of the sugar manufacturers.

In general the COQ categories expenditures indicate likely influence on organizations' performance. This therefore confirms the clear relationship in existence between COQ categories expenditures and organizational performance.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter of the project work provide for the summary of the findings as detailed in the data analysis, conclusion as to whether or not the research objective have been answered and recommendation as to the applicability of the findings in addressing the sugar manufacturers process improvement needs in respect to cost of quality concept and organizational performance.

5.2 Summary

The study has established that there is a general strong extent of recognition of the cost of quality categories among the Kenya sugar manufacturers with an average mean score of above 4.0 of the possible maximum 5. It has also indicated that the COQ categories have stronger interrelationships at a higher mean score about 4.0. The COQ categories activities have also been shown to stronger linear correlations with their respective expenditures at about 0.60 correlation strength. Regression analysis results indicated that COQ categories expenditures shall very strong influence on organizational performance, through the prediction levels as: prevention cost expenditure at about 97% strength, appraisal cost expenditure at 75.2% and external failure cost expenditure at about 91.6%. These levels of correlation and prediction strengths are significant enough so as to impact organizational performance.

5.3 Conclusion

The research findings have therefore shown that the relationship between cost of Quality and organizational performance in the Kenya sugar manufacturing firms is significant. The sugar manufacturers need therefore to make strong consideration for recognizing, identifying, measuring and having proper evaluation of the four categories of cost of quality categories on their activity levels and respective expenditures for meaningful process improvement and eventual evaluation on the possible return on quality as an investment and not as a general process expenditure.

5.4 Recommendation

The researcher would strongly recommend the establishment of a cost of quality system in the sugar manufacturing firms in Kenya as a means of managing costs that result from the non- recognized cost of quality categories, aiming at manageable costs of production as a competitive leverage.

5.5 Limitations of the study

The research findings out the data collected and analyzed, have only provided part opinion on the cost of quality concept and its relationship to organizational performance, but have remained short in suggesting model of implementation and adoption for completeness in application and process improvement decision making. The likely influence of the non returned questionnaires on the findings must also not be ignored and therefore remain as a limitation to the study.

5.6 Recommendation for Further Research

The research would wish recommend further studies in this area especially in establishing an appropriate cost of quality application model to the sugar manufacturers in Kenya as a means to prompting of cost of quality systems establishment in the various organizations, for improved performance enabled by accurate process decision making.

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APPENDICES

Appendix I: Questionnaire

I am student of the University of Nairobi pursuing a Master of Business Administration Degree (Operations Management option). As part of the course requirement under project work, I am conducting a study in Cost of Quality and organizational performance in the Kenya sugar industry. I therefore seek for your cooperation in filling the questionnaire as part of my data collection. Any information that you shall provide will be treated with absolute confidentiality and will be for academic purposes only. You may contact me on +254721330754 or email omolodan@ymail.com, in case of any inquiry as concern this exercise.

Organization's name…….

Participant's Title……..

PART A: COST OF QUALITY CATEGORIES RECOGNITION (Tick where appropriate i.e. only once per row)

1. Listed below are four categories of cost of quality dimensions which cumulatively may find use for specific performance measure. To what extent has your company had recognition of the dimensions elements as guided by the statements? Please rank them using the key guideline below; [5] – Very great extent, [4] – Great extent
[3] – Moderate extent, [2] – Small extent, [1] – Very small extent.

PREVENTION COSTS ACTIVITIES		**5**	**4**	**3**	**2**	**1**
1.	Organization quality plan developed and applied					
2.	Suppliers quality pre-qualification observed					
3.	Production quality control and assurance observed					
4.	Incoming supplies and process inspection plan developed and routinely observed.					
5.	Quality control appliances routinely standardized					
6.	Quality training and development plans observed					
APPRAISAL COSTS ACTIVITIES		**5**	**4**	**3**	**2**	**1**
1.	Suppliers surveillance plan developed and observed					
2.	Testing and inspection of incoming materials is					

	consistent and accurately observed.					
3.	Process audit is routinely conductedwith process improvements suggested and executed					
4.	Calibration of measuring and testing equipment routinely scheduled.					
5.	Receipts inspection continuously observed					
INTERNAL FAILURE COSTSACTIVITIES		**5**	**4**	**3**	**2**	**1**
1.	Resultant process scrap recognized and valued					
2.	Net cost of process scrap values are evaluated, recorded and reported					
3.	Scrap routinely incurred.					
4.	Rework labor and overhead costs are precisely evaluated, recorded and reported.					
5.	Disposal of defective products observed according to law and costs reported.					

EXTERNAL FAILURE COSTSACTIVITIES		**5**	**4**	**3**	**2**	**1**
1.	Liability arising from defective products appreciated, evaluated and reported.					
2.	Cost of field servicing and handling complaints are evaluated, recorded and reported					
3.	Warranty repairs and replacement costs are recognized					
4.	Lost sales arising from defective products are recognized and appropriately evaluated.					
5.	Returns allowances arising from quality problems are routinely recognized and evaluated.					

PART B: ORGANIZATIONAL COST OF QUALITY CATEGORIES EXPENDITURES(Ksh)

	COST OF QUALITY CATEGORY	**2016**
		COQ Expenditure
	PREVENTION COSTS	
1.	Supplier qualification costs	
2.	Receipts inspection supervision costs	
3.	Quality training and development costs	
4.	Suppliers survey costs	
5.	Process review consultation costs	
	APPRAISAL COSTS	
1.	Process audits- consultancy costs	
2.	Calibration of quality measuring and testing equipment costs	

3.	Process continuous Supervision	
4.	External quality inspectors fees	
5.	Final product testing and quality approval eg. Quality mark fee	
	INTERNAL FAILURE COSTS	
1.	Net process scrap value	
2.	Net cost of rework on defective product	
3.	Net process scrap disposal costs	
	EXTERNAL FAILURE COSTS	
1.	Lost sales due to quality non conformance	
2.	Warranty, repairs and replacement costs	
3.	Liability arising from defective products	

PART C: ORGANIZATIONAL PERFORMANCE FOR THE YEAR 2016

Sugar Production (MT)	
Final product Sales (Ksh)	
Profitability (Ksh)	

How much would rate your organization's performance against your expected level as a percentage for the period: expected ……..…… achieved……..

Appendix II: List of Kenya Sugar Manufacturers

Kenya Sugar Board, (1998 – 2013).Year Books of sugar statistics: *Kenya Sugar Board*, Nairobi.

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SUGAR COMPANIES IN KENYA 2017

1. Mumias sugar company ltd
2. Nzoia sugar company ltd
3. West Kenya sugar company ltd
4. Butali sugar company ltd
5. Kibos sugar company ltd
6. Muhoroni sugar company ltd (under receivership)
7. Chemelil sugar company ltd
8. Miwani sugar company ltd (under receivership)
9. Transmara sugar company ltd
10. SONY sugar company ltd
11. Sukari industries sugar co ltd
12. Kwale sugar company ltd

Source: Kenya Sugar Board (2017)