Sudan University of Science and Technology

College of Graduate Studies

Total Quality & Excellence Centre

Impact of Applying Cost of Quality On Customer Satisfaction
(Case study: National Industries Company- Sudan)

أثر تطبيق تكلفة الجودة على رضا العملاء
(دراسة حالة شركة الصناعات الوطنية)

Thesis submitted in partial fulfillment of the requirements for the Msc. in Total Quality Management & Excellence

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Role of applying test of Quality

On customer Satisfaction

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قال الله تعالى:

"واتقوا الله ويعلمكم الله والله بكل شئ عليم"

سورة البقرة – الآية282

قال رسول الله صلى الله عليه وسلم:

"من سلك طريقا يلتمس فيه علما سهل الله له به طريقا إلى الجنة"

رواه مسلم

Dedication:

This thesis is dedicated to my mother and to my father, who encouraged me all the way long.

ACKNOWLEDGEMENT:

Abstract:

In Sudan many organizations start to implement cost of quality program to improve their performance and the product quality.

The purpose of this study was to investigate the impact of applying cost of quality on customer satisfaction of National Industries Company – Sudan

Where researcher used a descriptive approach to its appropriateness for the purposes of the study.

The study main hypothesis: There is an impact of cost of quality on the customer satisfaction for National Industries Company of Sudan,and the sub hypothesis are : The top management of National Industries Company committed to implement, develop and maintained the cost of quality program , There is a high level of the customer satisfaction in National Industries Company for products and services and The is no statistically significant difference between implementing cost of quality program on national industries company and marketing benefit.

This study was conducted on a sample of (100) customers of National Industries Company's wholesaler customers. Questionnaire designed as a tool to collect data.

Results from the analysis of customer feedback showed high positive trends about the impact cost of quality on customer satisfaction for National Industries Company of Sudan, the study found that National Industries Company is committed to adopting and applying the cost of quality program, which is reflected in the customers' satisfaction, the adoption of cost of quality gives a high marketing benefits for National Industries Company.

The study recommended a series of recommendations including: all foods industries companies in Sudan implementing the cost of quality program that lead to continues improvement and operating in high level of quality standard, Develop a new system for Good delivery and availability with flexibility in marketing demand, the top management committing to involve customer in the strategic plan of the company and developing more polces to lead the customer satisfaction.

مستخلص الدراسة:

تسعى عدد من المؤسسات السودانية لتطبيق برنامج تكلفة الجودة لتحسين الاداء وتحسين جودة المنتجات.

هدفت هذه الدراسة إلى التعرف على أثر تطبيق تكلفة الجودة على رضا العملاء لشركة الصناعات الوطنية، حيث استخدم المنهج الوصفي لملاءمته لأغراض الدراسة.

كانت فرضية الدراسة الاساسية كالاتي: يوجد أثر لتكلفة الجودة على رضا العملاء لشركة الصناعات الوطنية وكانت الفرضيات الاخري كالاتي : الإدارة العليا لشركة الصناعات الوطنية ملتزمة بتطوير والمحافظة على برنامج تكلفة الجودة ،رضا العملاء في شركة الصناعات الوطنية عن المنتجات والخدمات عالي ، تكلفة الجودة له أثر على الفائدة التسويقية لشركة الصناعات الوطنية.

أجريت هذه الدراسة على عينة قوامها (100) تاجر جملة من عملاء شركة الصناعات الوطنية، وقد تم تصميم الاستبانة كأداة لجمع البيانات.

نتائج تحليل آراء عملاء شركة الصناعات الوطنية أوضحت نواحي إيجابية عالية عن أثر تكلفة الجودة على رضا العملاء ، ايضا توصلت الدراسة إلى مجموعة من النتائج أهمها أن شركة الصناعات الوطنية ملتزمة بتبني وتطبيق مبدأ تكلفة الجودة، حيث انعكس ذلك على نتائج انطباع العملاء تجاه الشركة ، مما أوضح أن تبني البرنامج يعطي ميزة تسويقية عالية.

توصلت الدراسة إلى عدد من التوصيات أهمها: كل الشكات الصناعية تسعى الى تطبيق برنامج تكلفة الجودة مما يقود الي تحسين الاداء والعمل وفقا لاعلى المعايير، وتطوير نظام جديد لنقل منتجات الشركة وضمان تواجدها وفقا لمتطلبات الاسواق، وعلى الإدارة العليا أن تلتزم بدمج آراء العملاء ضمنا للخطة الاستراتيجية للشركة، وتطوير سياسات تقود الى رضا العملاء.

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CHAPTER I
INTRODUCTION

CHAPTER I
Introduction

1.1 Introduction:

The cost of quality (COQ) approach to the measurement, management and control of quality defects in the production process is well established in manufacturing and service industries generally, it forms part of a collection of management Methods, which have been introduced to industries around the world, and is related to, and forms a subset of total quality management (TQM).

In order to improve quality an organization must take into account the costs associated with achieving quality since the objective of continuous improvement programs is not only to meet customer requirements, but also to do it at the lowest cost. This can only happen by reducing the costs needed to achieve quality, and the reduction of these costs is only possible if they are identified and measured.

Therefore, measuring and reporting the cost of quality (COQ) should be considered an important issue for managers.

Cost of quality has many components, always representing in:
- Managing the prevention cost.
- Managing the appraisal cost.
- Managing the internal failure cost.
- Managing the external failure cost.

1.2 Research problem:

In Sudan many organizations start to implement cost of quality program to improve their performance and the product quality.

This research trying to investigate the impact of implementation of cost of Quality program in food industries on the quality of process and

products by measuring the customers satisfaction in local food industry in Sudan.

1.3 Importance of the research:

The importance of this research is that it:

- Know the extent of customer satisfaction from National Industries Company and the impact of this trend on the competitive advantage in the labor market.

- This study will help companies that seeking to embrace the principles of cost of quality in the ways and methods used in this study to develop and improve its image in the community that work in it, and win the other companies respect. Other ways, to increase its competitive advantage on their counterparts from other companies.

- Can help the researchers who want to take benefit of this study in several aspects, to get more data to identify the nature of the study and the method used.

1.4 Research objectives:

The research aims to achieve the following:

1. To identify the cost of quality, its principles, cost of quality in food industries, its requirements for implementation, the impact of implementing cost of quality in production, positive and negative attitudes of cost of quality and the prevention of the internal and the external failure.

2. To measure the degree of top management commitment, customer satisfaction and marketing benefit of National Industry Company.

3. Drive a group of recommendations that could help all the food companies to reach to the level of reducing the failure costs & to reach the satisfaction for their customers.

1.5 Research questions:

- **Main question:**

  Is there any impact of cost of quality on customer satisfaction for National Industries Company of Sudan?

- **Sub questions:**

  1. To which extent the National Industries Company committed to the concept of cost of quality program?
  2. Do the implemented cost of quality programs consistent with the customer needs?
  3. Do the implemented cost of quality programs has positive competitive advantage?

1.6 Research hypothesis:

1.6.1 Main hypothesis:

There is an impact of cost of quality on the customer satisfaction.

1.6.2 Sub hypothesis:

- The top management of National Industries Company committed to implement, develop and maintained the cost of quality program.
- There is a high level of the customer satisfaction in National Industries Company for products and services.
- The is no statistically significant difference between implementing cost of quality program on national industries company and marketing benefit.

1.7 Research Methodology:

In this thesis I will use the descriptive analysis approach; because it is fit with the subject nature.

1.7.1 Information Sources:

- **Primary sources:**

    Questionnaire as a key tool to search, designed specifically for this purpose.

- **Secondary sources:**
    - Books.
    - Researches and academic studies and references.
    - Reports and records of the institutions and relevant authorities.
    - Specialized studies in the study field.
    - Web sites relevant.

1.7.2 Study limits:

- **Time limits:**

    Apr-2016 to Dec- 2016.

- Place limits:

    National Industries Company - Omdurman.

- Human limits:

    National Industries Company wholesaler customer (100).

1.8 Previous studies:

Study No. 1:

Entitled **"Measuring the cost of quality in a hotel restaurant operation"** By Collin Ramdeen, et al, 2007.

The objective of this research is to apply the cost of quality (COQ) concepts in a hotel restaurant environment using the PAF (prevention, appraisal, and failure costs) model. Then use the percentage of sales approach to evaluate the significance of the cost of quality measures in the PAF model.

This research involved reviewing available literature on the cost of quality framework.

Then through the process of interviews and secondary data collection, an analysis of the cost of quality measures in the PAF model was accomplished.

While researchers suggested that the cost of quality should be 2 to 4 percent of sales, the actual findings were 12 to 16 percent over a two-year period. These findings help the restaurant quality management team to reevaluate the quality of food and services, and provide justification for more investment in prevention activities.

Study No. 2:

Entitled **"Impact of Service Quality on Customer Satisfaction and Customer Loyalty: Evidence from Banking Sector"** By Mubbsher Munawar Khan and Mariam Fasih, 2014.

This study designed to determine the satisfaction level of banking customers regarding quality of different services provided by their bank and their loyalty with the respective bank. Service quality is studied within a spectrum of different dimensions. An effort is also made to find out which service quality dimensions may enhance customer satisfaction and customer loyalty in a better way.

Respondents are chosen from a range of varying demographic features using stratified random sampling Banks from both public and private sector are selected for sampling. Survey questionnaires were distributed among 270 customers of different banks. An 83% (225 respondents) valid response rate is yielded. Descriptive statistics, one sample t-test, correlation and regression are used to analyze the data.

Findings indicate that service quality and all its dimensions have significant and positive association with customer satisfaction and customer loyalty.

Study No. 3

Entitled **"Cost of quality usage and its relationship to quality system maturity"** By Victor E. Sower and Ross Quarles,2014.

The purposes of this study are to examine the relationship between the distribution of quality costs and the level of maturity of an organization's quality system, to assess the extent to which effective cost of quality systems and maturing quality systems affect organization performance, and to determine why some organizations do not utilize cost of quality systems. The study has a survey instrument was developed to determine the distribution of total quality cost among the four categories. The instrument also assesses the maturity of the organization's quality system.

Correlation analysis was used to examine the relationships between quality costs and quality system maturity.

The study has concluded to a lot of results, External failure costs were found to decline as a percentage of total cost of quality (COQ) as an organization's quality system matures. Total cost of quality was found to increase as an organization moved from a very low level of quality system maturity to a higher level. Sales and profit growth were not significantly correlated with the presence of a quality cost system or with the level of maturity of the quality system. Lack of management support was found to be the most common reason why organizations do not systematically track quality costs.

Study No. 4

Entitled "**Relationship between product quality and customer satisfaction**" By:Albert Vitales Cruz,2015.

The purpose of this quantitative survey study was to examine the relationship between product quality and customer satisfaction using product cost and product safety as mediators. The primary objective included examining and evaluating the variables in this study to determine the relationship between product quality and customer satisfaction in the U.S automobile industry marketplace. The secondary objective was to understand the consumer needs in purchasing U.S. automobiles.

In this study, He used a quantitative, cross-sectional survey research design with multiple regression and mediation statistical techniques to determine the relationship between the predictors and the dependent variable.

Results from this study the automobile manufacturing professional managers, and other stakeholders of how automobile quality, product cost, and product safety factors used to meet and enhance customer satisfaction in capital markets using the U.S. automobile market as the proxy. Customer satisfaction may include product quality, product safety, and product cost in purchasing U.S. automobiles.

Study No. 5

Entitled **"HIDDEN COSTS OF QUALITY: MEASUREMENT & ANALYSIS"** By: SailajaA , et al,2015.

The objective of this study is to identify measure and quantify all the hidden elements –direct, indirect and invisible elements of quality costs in all functional activities in the organization under study. Further the importance of such an analysis is ascertained by quantifying the impacts of

hidden costs on the overall quality cost as well as on the organizational bottom line.

The following methodology was adapted in this study:

1. Identification of all processes and quality cost elements in all corresponding activities, Comprehensive data collection and quantification, Grouping in to direct and hidden Cost of Quality.

2. Analysis of impact of hidden COQ on total quality cost and also on organizational bottom line.

3. Comparison of traditional COQ system with enhanced COQ with hidden costs included.

The study findings points out the fact that the hidden cost of quality is more than 3 times higher than the direct quality cost elements in the manufacturing firm and most of these hidden costs can be reduced or even eliminated by proper tracking and understanding the root causes.

This study highlights the inadequacy of traditional cost of quality system in tracking and assessing the overall costs of quality. In order to assess the overall cost of quality, the hidden costs also has to be identified, quantified, measured and analyzed. For tracing the hidden quality costs, it is necessary to move beyond the data produced by the traditional accounting system.

This also gives an insight to the huge impact of hidden quality costs to the organizational bottom line and points out the gold mine of improvements. Using this data the company can formulate survival strategies in the highly intensive competitive market scenario.

CHAPTER II
LITERETURE REVIEW

CHAPTER II
LITERETURE REVIEW

2.1 Literature Review

Many companies promote quality as the central customer value and consider it to be a critical success factor for achieving competitiveness.

Any serious attempt to improve quality must take into account the costs associated with achieving quality since the objective of continuous improvement programs is not only to meet customer requirements, but also to do it at the lowest cost.

There is no general agreement on a single broad definition of quality costs (Machowski and Dale, 1998,pp.12). However cost of quality is usually understood as the sum of conformance plus nonconformance costs, where cost of conformance is the price paid for prevention of poor quality (for example, inspection and quality appraisal) and cost of non-conformance is the cost of poor quality caused by product and service failure (for example, rework and returns).

According to Dale and Plunkett, it is now widely accepted that quality costs are: the costs incurred in the design, implementation, operation and maintenance of a quality management system, the cost of resources committed to continuous improvement, the costs of system, product and service failures, and all other necessary costs and non-value added activities required to achieve a quality product or service.

Some papers surveying cost of quality models have already been published. For example,(Tsai ,1998,pp26-30) in his article on cost of quality under activity-based costing carries out a review of the known cost of quality models and the literature related to them.

The main focus is however put on the prevention appraisal-failure (P-A-F) scheme.

(Porter and Rayner, 1992, pp.34.) make a more comprehensive survey of the published literature and present a detailed review of quality cost models, focusing again mainly on the P-A-F category and its limitations. Nevertheless, attention is drawn to other approaches such as Juran's scheme or process cost models, and the use of the models that would integrate both the costs and benefits of quality improvement.

(Plunkett and Dale ,1988,pp.12.) propose categorization of all P-A-F models into five groups, discuss them in the light of their research experience, and conclude that many of the published models are in accurate and misleading.

(Burgess, 1996,pp.45) later examined this classification and reduced the five types of cost of quality models into three categories. In the latter two references, a survey was made of various models that follow the P-A-F approach emphasizing the many differences between these models in terms of the relationships between major quality cost categories. However , other quality cost models were not discussed at all.

2.1 Cost Of Quality Models (COQ Models):

These are: P-A-F (prevention+ appraisal+ failure) or Crosby's model (conformance + non-conformance), opportunity cost models, process cost models (conformance + non-conformance) and ABC (activity based costing) models (value-added + non-value-added).

Most cost of quality models are based on the P-A-F classification (Plunkett and Dale, 1987, pp5).

It was Armand Feigenbaum, who in 1943 first devised a quality costing analysis when he and his team developed a dollar-based reporting system (Harrington, 2002,pp.10).

(Joseph Juran ,1951) initiated the concept of quality costing, the economics of quality and the graphical form of the cost of quality model.

(Armand Feigenbaum 1956) later proposed the now widely accepted quality cost categorization of prevention, appraisal and failure (internal and external) costs. Prevention costs are associated with actions taken to ensure that a process provides quality products and services.

Appraisal costs are associated with measuring the level of quality attained by the process.

Failure costs are incurred to correct quality in products and services before (internal) or after (external) delivery to the customer.

Juran later highlighted the traditional trade off that contrasts prevention plus appraisal costs with failure costs (Juran, 1962).

The basic suppositions of the PA-F model are that investment in prevention and appraisal activities will reduce failure costs, and that further investment in prevention activities will reduce appraisal costs (Porter and Rayner,1992; Plunkett and Dale, 1987).

The objective of cost of quality system is to find the level of quality that minimizes total cost of quality.

Feigenbaum's and Juran's P-A-F scheme has been adopted by the American Society for Quality Control (ASQC, 1970), and the British Standard Institute(BS6143, 1990), and is employed by most of the companies which use quality costing.

The Crosby's model (Crosby, 1979,pp.9) are similar to the P-A-F scheme.

Crosby sees quality as "conformance to requirements", and therefore, defines the cost of quality as the sum of price of conformance and price of non-conformance. The price of conformance is the cost involved in making certain that things are done right the first time, which includes actual prevention and appraisal costs, and the price of non-conformance is the money wasted when work fails to conform to customer requirements,

usually calculated by quantifying the cost of correcting, reworking or scrapping, which corresponds to actual failure costs.

The model is used in companies that measure quality costs; however, most of the time it is only a different terminology describing a P-A-F model (Goulden and Rawlins, 1995, pp 43), and the two costing structures are used interchangeably.

The importance of opportunity and intangible costs has been recently emphasized.
Intangible costs are costs that can be only estimated such as profits not earned because of lost customers and reduction in revenue owing to non-conformance.

(Sandoval-Chavez and Beruvides ,1998,pp.1-5) incorporate opportunity losses into traditional P-A-F quality expenses. According to them, opportunity losses may be broken down into three components: underutilization of installed capacity, inadequate material handling and poor delivery of service. They express total cost of quality as revenue lost and profit not earned.

(Modarress and Ansari, 1987,pp.2) also advocate that the PA-F model be expanded to accommodate extra dimensions that are identified as the cost of inefficient resource utilization and quality design cost.

Quality costs are defined in three categories: the cost of conformance, the cost of non-conformance and the cost of lost opportunity. Other authors address the cost of lost costumers derived from product failures that reach the market (Tatikonda and Tatikonda, 1996,pp.1).

Juran's model (Juran et al.,1951) also recognizes the importance of intangibles.

Cost of quality scheme includes two measurable cost categories: tangible factory costs and tangible sales costs, and he suggests the inclusion of intangible internal benefits. Albright and Roth (1992) have proposed

Taguchi's quality loss function as a means of estimating quality costs that are hidden by accounting systems.

Kim and Liao (1994) have extended the usefulness of this concept by developing various forms of quality loss functions and have showed how different loss functions can be used for measuring hidden quality costs for any variation of the actual value from the target value of designed characteristics of a product.

The process modeling method called IDEF (the computer- aided manufacturing integrated program definition methodology) developed by Ross (1977) is useful for experts in system modeling; nevertheless, for common use by managers or staff it is too complex. Simpler methods were developed to overcome this limitation.

 (Crossfield and Dale, 1990,pp.12) suggest a method for the mapping of quality assurance procedures, information flows and quality-related responsibilities.
(Goulden and Rawlins, 1995,pp.32) utilize a hybrid model for process quality costing where flowcharts are used to represent the main processes.

The use of a process cost model is suggested as a preferred method for quality costing within total quality management (TQM) as it recognizes the importance of process cost measurement and ownership, and presents a more integrated approach to quality than a P-A-F model (Porter and Rayner, 1992).

 (Goulden and Rawlins, 1995,pp.20) also suggest that the cost of each process rather than on an arbitrarily defined cost of quality under a P-A-F model. Moreover, the quality cost categorization is simpler and some researchers (Porter and Rayner, 1992) argue that it is also more relevant than the P-A-F scheme.

The process model has wider application in that it facilitates the collection and analysis of quality costs for both direct and indirect

functions. However, the process cost model is not in widespread use (Goulden and Rawlins, 1995,pp.4).

An activity-based costing (ABC) model was developed by Cooper and Kaplan (Cooper, 1988; Cooper and Kaplan, 1988) to solve this problem. Under ABC, accurate costs for various cost objects are achieved by tracing resource costs to their respective activities and the cost of activities to cost objects.

The ABC approach is actually not a cost of quality model. It is an alternative approach that can be used to identify, quantify and allocate quality costs among products, and therefore, helps to manage quality costs more effectively.

(Tsai ,1998,pp.1-12) proposes an integrated cost of quality -ABC framework, in which ABC and cost of quality systems are merged and share a common database in order to supply various cost and nonfinancial information for related management techniques. The long-term goal of ABC systems is to eliminate non-value added activities and to continuously improve processes, activities and quality so that no defects are produced.

2.2. Cost of Quality:

2.2.1 Cost of Achieving Good Quality:

1. Prevention costs (costs incurred during product design):
   - Quality planning costs (costs of developing and implementing quality management program)
   - Product-design costs (costs of designing products with quality characteristics)
   - Process costs (costs expended to make sure productive process conforms to quality specifications)
2. Appraisal costs (costs of measuring, testing, and analyzing)

- Inspection and testing (costs of testing and inspecting materials, parts, and product at various stages and at the end of a process)
- Test equipment costs (costs of maintaining equipment used in testing quality characteristics of products).
- Operator costs (costs of time spent by operators to gar data for testing product quality, to make equipment adjustments to maintain quality, and to stop work to assess quality).

2.2.2 Cost of Poor Quality:

1. Internal failure costs (include scrap, rework, process failure, downtime, and price reductions).
   - Scrap costs (costs of poor-quality products that must be discarded, including labor, material, and indirect costs)
   - Rework costs (costs of fixing defective products to conform to quality specifications)
   - Process failure costs (costs of determining why production process is producing poor-quality products)
   - Process downtime costs (costs of shutting down productive process to fix problem).
   - Price-downgrading costs (costs of discounting poor-quality products— that is, selling products as "seconds").
2. External failure costs (include complaints, returns, warranty claims, liability, and lost sales)
   - Customer complaint costs (costs of investigating and satisfactorily responding to a customer complaint resulting from a poor-quality product)
   - Product return costs (costs of handling and replacing poor-quality products returned by customer)
   - Warranty claims costs (costs of complying with product warranties)

- Product liability costs (litigation costs resulting from product liability and customer injury)

- Lost sales costs (costs incurred because customers are dissatisfied with poor quality products and do not make additional purchases).

2.3 Benefits of using quality costs:

➢ Allows you to translate in monetary terms the importance of the problem.

➢ Used to report the problems associated with quality products to the address of the company, so that it can carry out corrective actions.

➢ Help to change the thinking of company personnel because it raises awareness of the consequences of quality problems brings to the organization.

➢ It highlights the financial problems on the organization.

➢ The costs of quality can have negative consequences for organizational life.

➢ Allows for the reduction of costs because they can identify problems to create solutions to them.

➢ The quantification of quality costs that identifies areas of the company are the most important values.

➢ Allows you to evaluate the impact of corrective actions will have on the organization.

➢ Allows budget increase of costs associated with quality.

➢ The company's financial area will be modified by the incorporation of quality costs.

➢ Prepare the organization so that corrective action is taken in production processes and in different areas of the company.

2.4 Steps in implementing quality costs:

The following sequence applies to most organizations:

First of all, in order to implement a Quality Cost program, organization should constitute a Quality Cost Team for it successful implementation. The quality cost implementing team may have members from only quality assurance department or it may be multidiscipline team. The team should be well versed with various quality cost concepts.

The various inputs for starting a quality cost program are:

- Top Management Support
- Organizational resources
- Quality Objectives
- Organizational Objectives.

The next step should be to decide about quality cost base. Total quality cost compared to applicable base results in index which may be periodically analyzed in relation to past indices and peer industries. The base used should be representative of, and sensitive to, fluctuations in business activity.

Generally any one out of following bases is used:

- A labor base - such as total labor, direct labor etc.
- A cost base - such as shop cost, operating cost, or total material and labor
- A sale base - such as net sales billed or sales value of finished goods and services
- A unit base - such as number of units produced, the number of services performed, or the volume of output.

The next step shall be collection of data related to various cost of quality elements. These data might not be readily available. As many appraisal and internal failure costs are considered a normal part of operations. For that, these costs could be calculated with the help of various cost sheets,

files, statements and interviews of different persons associated indifferent departments, In some cases, one may also estimate these costs (if needed).The next step in this regard shall be of putting these quality cost elements in following four types of quality cost categories:

• Prevention costs.

• Appraisal costs.

• Internal failure costs.

• External failure costs.

In this step, the different quality costs collected in Step-4 should be analyzed. The data can be put in Excel spread sheet and different tools can be applied. Further, the presence of any trend (if any) can also be verified.

The help of Pareto analysis can also be taken so as to find out those few quality costs which are responsible for majority of total quality costs. The quality costs should be calculated as percentage of previously decided base.

In this step, different ways and means should be decided so as to reduce the present level of quality cost. Here, resources/investment required for reducing quality costs and there after its impact on reduction of targeted quality costs should also be estimated. This is an important activity as any proposed investment activity should be justified to management. Here present level of quality costs in terms of money terms like costs of quality in percentage of total sales, costs of quality in percentage of profits should be communicated to top management. Further, to reduce the present level of quality costs, all the proposed quality efforts along with their likely financial burden and proposed estimated savings in quality costs over a period of time should also be essentially mentioned.

Top management should be convinced to give their acceptance for proposed changes investments so that in the long run net savings in quality costs will overshadow proposed changes investments.

In the last step, changes approved by top management should be implemented in the whole system.

2.5 management commitment:

Top management commitment plays a vital role for implementing a cost of quality program .

Management commitment is not a gift. It is earned and maintained through hard work, loyalty, communication and good staff work. Commitment from top management may be the most critical factor in the success of any programs.

Top management is always concerned with time and money factor. The strongest continuous improvement processes like cost of quality are the ones that begin with and have genuine involvement of top-level management.

Cost of quality should be aligned with management strategic business so that it can assure top management commitment.

2.6 customer Satisfaction:

Customer satisfaction is a marketing term that measures how products or services supplied by a company meet or surpass a customer's expectation.

Today's competitive market, in almost every category of products and services, is characterized by accelerating changes, innovation, and massive amounts of new information. Much of this rapid evolution in markets is fueled by changing customer needs.
Significant customer behavior and market changes happen almost overnight. Changes in market preference or technology, which used to take years, may now take place in a few short months.

As the pace of change accelerates, it becomes more difficult to maintain stable relationships with suppliers, customers, brokers, distributors, and even your own company personnel. Commitment to product quality and customer satisfaction programs are essential for companies to compete against competitors. Thinking about 'post-sale' customer satisfaction (or managing customer 'dissatisfaction') programs as a way to reinforce customers' buying preferences for companies products and services for their current and future purchases.

Quality of product is also defined according to the extent to which customer's expectations, needs and demands are met. Customer's choose products which maximize delivered value (Kotler, 1998). This results in another purchase or customer loyalty. The discrepancy between customer's expected product and delivered (perceived) product is a basic measure for quality of product and customer satisfaction.

Customer satisfaction shows whether we are doing the right things and whether we are doing them in the right way. A customer is the only financial contributor and in times of harsh competition customer satisfaction plays a more and more important role in making a purchase decision (Goodman and Colin 1992).

2.6.1 Why Customer Satisfaction is Important:

The top six reasons why customer satisfaction is so important:

- It's a leading indicator of consumer repurchase intentions and loyalty.
- It's a point of differentiation.
- It reduces customer churn.
- It increases customer lifetime value.
- It reduces negative word of mouth.
- It's cheaper to retain customers than acquire new ones.

2.6.2 4 Key Customer Satisfaction Measurements:

1. Overall Satisfaction Measure (Emotional).

2. Loyalty Measurement (Affective, Behavioral).

3. A Series of Attribute Satisfaction Measurements (Affective and Cognitive).

4. Intentions to Repurchase Measurements (Behavioral Measures).

2.7 Marketing Benefits:

Marketing management is the organizational discipline which focuses on the practical application of marketing orientation, techniques and methods inside enterprises and organizations and on the management of a firm's marketing resources and activities.

The biggest advantage of a marketing plan is building a bridge between the vision of the organization and the marketing and sales of products and services.

At the strategic (upper management) level, organizations have a mission and vision. This mission and vision must translate from the executive team to all internal and external stakeholders. This is called alignment, or having all stakeholders.

Marketing plans are particularly useful in aligning the vision with the brand, and ensuring that what is communicated to potential customers is accurate and meaningful to the core target market.

2.8 National Industries Company:

2.8.1 Establishment:

National Industries Company established in 1971 and was the first to produce sweetness (Halva) as a contribution to the development of industry in Sudan With the increasing demand and in response to consumer desire was inaugurated produce another line of Halva on local of Omdurman-Repeat in 2010, card high productivity, and spread the sales network to cover all states of the Sudan and some neighboring countries and the Arabian Gulf, the company leading up to the expectations of the consumer to cover consumer requirements and exceeded expectations, added new product lines such as the production line sweetness died two angels, production line Frutana juice, sugar, lentils Cartridge, Tahini.

All stages of production are done by high-quality machines without the use of labor thereby maintaining the cleanliness and safety of the product from any contamination.

2.8.2 Vision:

To become pioneers of manufacturing, development and marketing of food products according to the highest standards of quality, while ensuring the sustainability of excellence regionally and internationally.

2.8.3 Mission:

Providing products of high quality and according to the food safety standards adopted globally.

2.8.4 Values:

- Honesty
- Integrity
- Commitment

- Build team spirit
- creativity and innovation

2.8.5 Strategic goals:

- Work on customers and consumers satisfaction.
- Production of new products to meet customer requirements.
- Reduce production costs.
- Continuous improvement and development in the company's activities.

2.8.6 Activity:

Manufacturing Biscuits and sweets and Re-packaging a number of products.

2.8.7 ISO Certificates:

National Industries Company- SUDAN obtain the conformity certificate for system: (ISO 9001: 2008) that conferred on it by international accredited company the United Kingdom Accreditation Service (UKAS).

CHAPTER III
MATERIALS and METHODS

CHAPTER THREE
Materials and Methods

This chapter contains description of the materials and methods followed by the researcher for determining the study population and sample, the study tool, the verification steps of the accuracy and stability of the search tool, also a description of the study design and statistical methods that used in data analysis**.**

3.1 Study methodology:

This study based on theoretical background of methodology and the quantities design using a hypothesis testing approach.

3.2 Study population:

The study population consisted of sample of National Industries Company wholesaler customers.

3.3 Study sample:

The study sample consisted of (100) from National Industries Company-Sudan (Omdurman) wholesaler customers, were selected as the stratified random method.

3.4 Questionnaire design:

The aim of the questionnaire design (study tool) is to translate the research objectives into specific questions. The answers of these questions should provide data for answering all or some of the research questions.

The researcher visited Wholesalers in Omdurman by using quality and marketing department.

The study tool include on the three main parts are (Appendix 1):

The first: was devoted to measure the commitment of top management in the National Industries Company.

The second: was devoted to measure the level of the customer's satisfaction in National Industries Company.

The third: was devoted to measure the implementing cost of quality program in National Industries Company on marketing benefits.

The fourth: The researcher used the Likert scale, which calculates the weights of those paragraphs as follows:

(80 - 100)%   High agree

(70 – 79.9)%   Agree

(60 – 69.9)%   I don't know

(50 – 59.9)%   Disagree

(Less than 50%)   High disagree

3.5 Believe study tool:

The study was presented on number of validators in the field of study, so the measure became in the final form.

3.6 Study procedures:

I have been conducting this study, according to the following steps:

1. Preparation of the study measurements of the final image.

2. Identify the study sample.

3. Distribute the study tool on the study sample, and retrieval, where distributed (100) questionnaires, have been received (100), which formed the study sample.

4. Enter the data into the computer and processed statistically using the Statistical Package for Social Sciences (SPSS).

5. Extracting, analyzing and discussing the results.

3.7 Statistical Processing:

Data are encoded and processed statistically using the Statistical Package for Social Sciences (SPSS).

Statistically processors used:

1. Frequencies and percentages to determine the characteristics of the study sample in the light of demographic characteristics and all with regard to the study.
2. Frequency distribution.
3. Person correlation coefficient.
4. Spearman equation for calculating reliability and validity coefficient.
5. Non-parametric ,chi-square test
6. SPSS (statistical package for social sciences).

CHAPTER IV
RESULTS of RESEARCH

CHAPTER IV
Results of Research

This study aimed to identify the impact of cost of quality on the customer satisfaction of National Industries Company (Sudan).

To achieve the objective of the study, questionnaire was prepared, and the coefficient of stability, and after the data collection process, are encoded and entered computer and processed statistically using the Statistical Package for Social Sciences (SPSS) here are the results of the study according to the sequence of questions, and hypotheses.

4.1 Reliability and Validity of the Questionnaire:
4.1.1 Apparent Reliability and Validity:

In order to check the apparent validity for the study questionnaire and validation of its statements according to the formulation and explanation, the researcher showed the questionnaire to the quality management system ISO auditors who are specialists in the study field. Some of the auditors make some suggestions, an others agreed that the questionnaire is suitable. In any way, the researcher studied all suggestions, and some corrections on his questionnaire have been done. The following table is showing the auditors and their jobs and places of work see Appendix B.

4.2 Statistical Instruments:

In order to satisfy the study objectives and to test its hypotheses, we use the following statistical instruments:

1. Frequency distribution.
2. Person correlation coefficient.
3. Spearman-Brown equation for calculating Reliability coefficient.
4. Median.

5. Non-parametric Chi-square test.

4.3 Results concerning the study questions:

Main question text: "Is there any impact of cost of quality program on the customer satisfaction on National Industries Company?" and other question related to it.

(80 - 100)%   High agree

(70 – 79.9)%   agree

(60 – 69.9)%   I don't know

(50 – 59.9)%   disagree

(Less than 50%)   High disagree

Table (4.1) explains the results:

Table 4.1: Results of the questionnaire analysis

No	Paragraphs	Average	Standard Deviation	Percentage %	Degree
1	National Industries Company management is committed to applying the standards, programs and systems of international quality.	4.19	0.64	83.8%	High agree
2	National Industries Company management is committed to providing free from defects in the product packaging.	3.6	0.77	72%	Agree
3	National Industries company products are reflecting appositive quality reputation.	3.59	0.83	71.8%	Agree
4	National Industries Company develops its products according to customer expectations.	3.84	0.91	76.8%	Agree
5	National Industries Company select defect in their products.	3.99	0.96	79.8%	Agree
6	National Industries company products have a fixed price.	4.01	0.89	80.2%	High agree

7	National Industries Company management enhance responsiveness to customer complaints	4.01	0.88	80.2%	High agree
8	National Industries Company management committed to listening to customer suggestions	4.26	0.81	85.2%	High agree
	The first area: Top management's commitment to apply quality costs system	**3.93**	**0.84**	**78.7%**	Agree
9	Quality Systems reduced negative feedback from consumers.	4.34	0.78	86.8%	High agree
10	Quality Systems enhance to cover market with products.	4.46	0.65	89.2%	High agree
11	Quality Systems increased customer confidence and methods of dealing.	3.54	0.91	70.8%	Agree
12	Products offered by the National Industries Company meet consumers' needs.	3.57	0.83	71.4%	Agree
13	National Industries Company products offered on high quality and excellent manner.	4.26	0.74	85.2%	High agree
14	National Industries Company is committed to a timetable for the distribution of products.	3.53	0.81	70.6%	Agree
15	National Industries company management allows customer to participate in building of quality standards for products	4.3	0.79	86%	High agree
16	National Industries company management allows customer to participate in design products.	4.33	0.68	86.6%	High agree
	The second area: Customers satisfaction from company products and services	**4.04**	**0.77**	**80.8**%	High agree
17	The marketing benefits of the National Industries Company resulting from the quality products.	4.3	0.79	86%	High agree
18	The marketing benefits of the National Industries Company resulting from the products	4.33	0.68	86.6%	High agree

No	Paragraphs	Average	Standard Deviation	Percentage%	Degree
19	The marketing benefits of the National Industries Company resulting from the low cost products.	3.97	0.87	79.4%	Agree
20	The marketing benefits of the National Industries Company resulting from build long term relationship.	4.49	0.83	89.8%	High agree
	The third area: marketing benefit	**4.27**	**0.79**	**85.5%**	High agree
	Sum	**4.08**	**0.80**	**81.7%**	High agree

Source: Student studies

Seen from the table (4.1) the impact of cost of quality system on the customer satisfaction for National Industries Company (Sudan) from the view point of the customer got MEAN (4.08), and a standard deviation (0.80) and highly significant response and a percentage (81.7%)

4.4 Results concerning the study hypothesis:

4.4.1 Results for the first hypothesis:

Top management of national industries company committed to implement, develop and maintain the cost of quality system ($\alpha = 0.05$).

Table 4.2: Results of the first hypothesis:

No	Paragraphs	Average	Standard Deviation	Percentage%	Degree
1	National Industries Company management is committed to applying the standards,	4.19	0.64	83.8%	High agree

	programs and systems of international quality.				
2	National Industries Company management is committed to providing free from defects in the product packaging.	3.6	0.77	72%	Agree
3	National Industries Company products are reflecting appositive quality reputation.	3.59	0.83	71.8%	Agree
4	National Industries Company develops its products according to customer expectations.	3.84	0.91	76.8%	Agree
5	National Industries Company select defect in their products.	3.99	0.96	79.8%	Agree
6	National Industries company products have a fixed price.	4.01	0.89	80.2%	High agree
7	National Industries Company management enhance responsiveness to customer complaints	4.01	0.88	80.2%	High agree
8	National Industries Company management committed to listening to customer suggestions	4.26	0.81	85.2%	High agree

Source: Student studies.

Table 4.3: Chi-square test results of the first hypothesis.

No	Paragraphs	Average	Degree of freedom	Chi-square value	Degree
1	National Industries Company management is committed to applying the standards, programs and systems of international quality.	4.19	4	19.96	High agree
2	National Industries Company management is committed to providing free from defects in the product packaging.	3.6	4	32	Agree
3	National Industries Company products are reflecting appositive quality reputation.	3.59	4	15.90	Agree
4	National Industries Company develops its products according to customer expectations.	3.84	4	26.60	Agree
5	National Industries Company select defect in their products.	3.99	4	22.40	Agree
6	National Industries company products have a fixed price.	4.01	4	21.60	High agree
7	National Industries Company management enhance responsiveness to customer complaints	4.01	4	38	High agree
8	National Industries Company management committed to listening to customer suggestions	4.26	4	22.40	High agree

Source: Student studies

The p-value for the significant differences for the respondents' answers in the 1st question was (0.0) which is less than significant value level (0.05) at the degree of freedom (4) and the significant value level (5%).

According to what mentioned in table no.(4.3), this indicates that, there are statistically significant differences at the level (5%) among the answers of the respondents, which support the respondents who have high agree with that National Industries Company management is committed to applying the standards, programs and systems of international quality.

The p-value for the significant differences for the respondents' answers in the 2nd question was (0.0) which is less than the significant value level (0.05) at the degree of freedom (4) and the significant value level (5%). According to what mentioned in table no.(4.3), this indicates that, there are statistically significant differences at the level (5%) among the answers of the respondents, which support the respondents who have agree with that National Industries Company management is committed to providing free from defects in the product packaging.

The p-value for the significant differences for the respondents' answers in the 3rd question was (0.0) which is less than the significant value level (0.05) at the degree of freedom (4) and the significant value level (5%). According to what mentioned in table no.(4.3), this indicates that, there are statistically significant differences at the level (5%) among the answers of the respondents, which support the respondents who have agree with that National Industries Company products are reflecting appositive quality reputation.

The p-value for the significance of the differences for the respondents' answers in the 4th question was (0.03) which is less than significant value level(0.05) at the degree of freedom (4) and the significant value level (5%). According to what mentioned in table no.(4.3) this indicates that, there are statistically significant differences at the level (5%) among the answers of the respondents, which support the respondents who agree with that the National Industries Company develops its products according to customer expectations.

The p-value for the significant differences for the respondents' answers in the 5th question was (0.00) which is less than significant value level(0.05) at the degree of freedom (4) and the significant value level (5%). According to what mentioned in table no.(4.3), this indicates that, there are statistically significant differences at the level (5%) among the answers of the respondents, which support the respondents who have agree with that The National Industries Company select defect in their products.

The p-value for the significant differences for the respondents' answers in the 6th question was (0.012) which is less than the significant value level(0.05) at the degree of freedom (4) and the significant value level (5%). According to what mentioned in table no.(4.3), this indicates that, there are statistically significant differences at the level (5%) among the answers of the respondents, which support the respondents who have high agree with that National Industries company products have a fixed price.

The p-value for the significant differences for the respondents' answers in the 7th question was (0.0) which is less than the significant value level(0.05) at the degree of freedom (4) and the significant value level (5%). According to what mentioned in table no.(4.3), this indicates that, there are statistically significant differences at the level (5%) among the answers of the respondents, which support the respondents who have high agree with that National Industries Company management enhance responsiveness to customer complaints.

The p-value for the significant differences for the respondents' answers in the 8th question was (0.0) which is less than the significant value level(0.05) at the degree of freedom (4) and the significant value level (5%). According to what mentioned in table no.(4.3), this indicates that, there are statistically significant differences at the level (5%) among the answers of the respondents, which support the respondents who have high

agree with that National Industries Company management committed to listening to customer suggestions.

4.4.2 Results for the second hypothesis:

There is a high level of the customer satisfaction in national industries company for their products and services.

Table 4.4: Results of the second hypothesis:

No	Paragraphs	Average	Standard Deviation	Percent age%	Degree
1	Quality Systems reduced negative feedback from consumers.	4.34	0.78	86.8%	High agree
2	Quality Systems enhance to cover market with products.	4.46	0.65	89.2%	High agree
3	Quality Systems increased customer confidence and methods of dealing.	3.54	0.91	70.8%	High agree
4	Products offered by the National Industries Company meet consumers' needs.	3.57	0.83	71.4%	Agree
5	National Industries Company products offered on high quality and excellent manner.	4.26	0.74	85.2%	High agree
6	National Industries Company is committed to	3.53	0.81	70.6%	Agree

No	Paragraphs				
	a timetable for the distribution of products.				
7	National Industries company management allows customer to participate in building of quality standards for products	4.3	0.79	86%	High agree
8	National Industries company management allows customer to participate in design products.	4.33	0.68	86.6%	High agree

Source: Student studies

Table 4.5:Chi-square test results of the second hypothesis.

No	Paragraphs	Average	Degree of freedom	Chi-square value	Degree
1	Quality Systems reduced negative feedback from consumers.	4.34	4	20	High agree
2	Quality Systems enhance to cover market with products.	4.46	4	15.10	High agree
3	Quality Systems increased customer confidence and methods of dealing.	3.54	4	13.80	Agree
4	Products offered by the	3.57	4	16.30	Agree

	National Industries Company meet consumers' needs.				
5	National Industries Company products offered on high quality and excellent manner.	4.26	4	15.60	High agree
6	National Industries Company is committed to a timetable for the distribution of products.	3.53	4	17.20	Agree
7	National Industries company management allows customer to participate in building of quality standards for products	4.3	4	18.10	High agree
8	National Industries company management allows customer to participate in design products.	4.33	4	21	High agree

Source: Student studies

The p-value for the significant differences for the respondents' answers in the 1st question was (0.0) which is less than the significant value level(0.05) at the degree of freedom (4) and the significant value level (5%). According to what mentioned in table no.(4.5), this indicates that, there are statistically significant differences at the level (5%) among the

answers of the respondents, which support the respondents who high agree with that Quality Systems reduced negative feedback from consumers.

The p-value for the significant differences for the respondents' answers in the 2nd question was (0.0) which is less than the significant value level(0.05) at the degree of freedom (4) and the significant value level (5%). According to what mentioned in table no.(4.5), this indicates that, there are statistically significant differences at the level (5%) among the answers of the respondents, which support the respondents who strongly agree with that Quality Systems enhance to cover market with products.

The p-value for the significance of the differences for the respondents' answers in the 3th question was (0.0) which is less than the significant value level (0.05) at the degree of freedom (4) and the significant value level (5%). According to what mentioned in table no.(4.5), this indicates that, there are statistically significant differences at the level (5%) among the answers of the respondents, which support the respondents who agree with that Quality Systems increased customer confidence and methods of dealing.

The p-value for the significant differences for the respondents' answers in the 4th question was (0.0) which is less than the significant value level (0.05) at the degree of freedom (4) and the significant value level (5%). According to what mentioned in table no.(4.5), this indicates that, there are statistically significant differences at the level (5%) among the answers of the respondents, which support the respondents who agree with that products offered by the National Industries Company meet consumers' needs.

The p-value for the significant differences for the respondents' answers in the 5th question was (0.01) which is less than the significant value level(0.05) at the degree of freedom (4) and the significant value level (5%). According to what mentioned in table no.(4.5), this indicates that,

there are statistically significant differences at the level (5%) among the answers of the respondents, which support the respondents who high agree with that National Industries Company products offered on high quality and excellent manner.

The p-value for the significant differences for the respondents' answers in the 6th question was (0.0) which is less than the significant value level(0.05) at the degree of freedom (4) and the significant value level (5%). According to what mentioned in table no.(4.5), this indicates that, there are statistically significant differences at the level (5%) among the answers of the respondents, which support the respondents who agree with that National Industries Company is committed to a timetable for the distribution of products.

The p-value for the significant differences for the respondents' answers in the 7th question was (0. 0) which is less than the significant value level(0.05) at the degree of freedom (4) and the significant value level (5%). According to what mentioned in table no.(4.5), this indicates that, there are statistically significant differences at the level (5%) among the answers of the respondents, which support the respondents who high agree with that National Industries company management allows customer to participate in building of quality standards for products.

The p-value for the significant differences for the respondents' answers in the 8th question was (0.0) which is less than the significant value level(0.05) at the degree of freedom (4) and the significant value level (5%). According to what mentioned in table no.(4.5), this indicates that, there are statistically significant differences at the level (5%) among the answers of the respondents, which support the respondents who high agree with that National Industries company management allows customer to participate in design products.

4.4.3 Results for the third hypothesis:

There is no statistically significant difference between implementing cost of quality system on national industries company and marketing benefit.

Table 4.6: Results of the third hypothesis:

No	Paragraphs	Average	Standard Deviation	Percentage%	Degree
1	The marketing benefits of the National Industries Company resulting from the quality products.	4.3	0.79	86%	High agree
2	National Industries Company management is committed to providing free from defects in the product packaging.	4.33	0.68	86.6%	High agree
3	The marketing benefits of the National Industries Company resulting from the low cost products.	3.97	0.87	79.4%	Agree
4	The marketing benefits of the National Industries Company resulting from Build long term relationship.	4.49	0.83	89.8%	High agree

Source: Student studies.

Table 4.7: Chi-square test results of the third hypothesis:

No	Paragraphs	Average	Degree of freedom	Chi-square value	Degree
1	The marketing benefits of the National Industries Company resulting from the quality products.	4.3	4	17.82	High agree
2	National Industries Company management is committed to providing free from defects in the product packaging.	4.33	4	14.80	High agree
3	The marketing benefits of the National Industries Company resulting from the low cost products.	3.97	4	14.00	Agree
4	The marketing benefits of the National Industries Company resulting from Build long term relationship.	4.49	4	16.13	High agree

Source: Student studies

The p-value for the significant differences for the respondents' answers in the 1st question was (0.0) which is less than the significant value level(0.05) at the degree of freedom (4) and the significant value level (5%). According to what mentioned in table no.(4.7), this indicates that, there are statistically significant differences at the level (5%) among the answers of the respondents, which support the respondents who high agree

with that the marketing benefits of the National Industries Company resulting from the quality products.

The p-value for the significance of the differences for the respondents' answers in the 2nd question was (0.04) which is less than the significant value level(0.05) at the degree of freedom (4) and the significant value level (5%). According to what mentioned in table no.(4.7), this indicates that, there are statistically significant differences at the level (5%) among the answers of the respondents, which support the respondents who High agree with that National Industries Company management is committed to providing free from defects in the product packaging.

The p-value for the significance of the differences for the respondents' answers in the 3th question was (0.0) which is less than the significant value level(0.05) at the degree of freedom (4) and the significant value level (5%). According to what mentioned in table no.(4.7), this indicates that, there are statistically significant differences at the level (5%) among the answers of the respondents, which support the respondents who agree with that the marketing benefits of the National Industries Company resulting from the low cost products.

The p-value for the significance of the differences for the respondents' answers in the 4th question was (0.0) which is less than the significant value level(0.05) at the degree of freedom (4) and the significant value level (5%). According to what mentioned in table no.(4.7), this indicates that, there are statistically significant differences at the level (5%) among the answers of the respondents, which support the respondents who high agree with that the marketing benefits of the National Industries Company resulting from Build long term relationship.

Table 4.8: Chi-square test results for respondents' answers about
Customers satisfaction in general

statements	median	Degree of freedom	Chi- square value	sig
All	6	4	186.6	0.18

Source: Student studies

The P-value(sig) is $>$ α (5%) then implementing cost of quality leads to customers' satisfaction.

4.5 Results:

4.5.1 Results for the first hypothesis:

The top management on National Industries Company committed to implement, develop and maintain the cost of quality system**.**

4.5.2 Results for the second hypothesis:

There is a high level of the customer satisfaction in National Industry Company.

4.5.3 Results for the third hypothesis:

The implementing cost of quality system leads to marketing benefit

CHAPTER V
DISCUSSION, CONCLUSION
and RECOMMENDATIONS

CHAPTER V
Discussion, Conclusion and Recommendations

5.1 Discussion:

This chapter includes a presentation and discussion of the most important findings of the study and providing the conclusion and a set of recommendations that came out from the study results. The study was conducted on a sample of national industry company (Sudan) customers. The researcher distributed the questionnaires to (100) customers and received (100), which formed the study sample. The data were input into the computer and processed statistically using the Statistical Package for Social Sciences (SPSS), Frequency distribution , Non-parametric ,chi-square test.

After extracting and analyzing the results have been interpreted as the following:

The first hypothesis: The top management on national industries company committed to implement, develop and maintain the cost of quality system.

We find that the top management committed to applying the standards, reflecting appositive quality reputation, develops its products, select defect in their products, fixed price and enhance responsiveness to customer complaints.

The second hypothesis: There is a high level of the customer satisfaction in National Industries Company.

There is a satisfaction level from customer regarding to the impact of implementation cost of quality on products standards, showing that the company products are reflecting a positive quality reputation and the company is usually addresses the nonconformity on their product quality, to fix the problem and maintain the good quality standards.

They are highly satisfied with the company enhances and develop quality standards of their products and stimulation of the regular supply system and product availability whenever needed, to get the maximum marketing benefits. Customers are highly satisfied with the customer-company relationship in terms of participation in the product survey, and there is high level of customer satisfaction with the communication between them and the company also there is effective communication regarding to the customer feedback from the market.

The third hypothesis: There is no statistically significant difference between implementing cost of quality system on national industries company and marketing benefit.

The National Industries Company has marketing benefit came from the quality products, free defects in the product packaging, low cost products and from Build long term relationship.

5.2 Conclusion:

- In the food industries quality is an important matter and quality management method like measuring the cost of quality is an effective tool for improving performance and has a direct influence on the customer satisfaction.

- According to this study in which the researcher aimed to measure the impact of implementing cost of quality on customer satisfaction on the National Industries Company, implementing cost of quality on this company leads to customer satisfaction and this leads to the recommendation for generalizing implementation of this method in all the food industries companies on Sudan.

- Also, practicing the cost of quality method has a direct impact on the quality of product by appraisal and inspection the product along the

processes, which may decrease the defect in these products and minimizing the failure whether is internal or external.

5.3 Recommendations:

After analyzing the results of the questionnaires distributed to National Industry Company customers this research recommends that further research will help solving limitations of it's by taking the following points in account:

1. From the result the researcher suggest all foods industries companies in Sudan implementing the cost of quality program that lead to continues improvement and operating in high level of quality standard.
2. Aware the workforce that the program has a lot of benefit related to the people who maintain the system.
3. Developing more polices to lead the customer satisfaction.
4. The top management committing to involve customer in the strategic plan of the company.
5. Use the cost of quality method to monitoring and measuring equipment and the daily output to increase the accuracy of process, productivity and other quality assessment tools and adopt new methods for assessing evaluation and measuring quality standard in the company.
6. The company which implemented the cost of quality should think about the stage after this and to implement total quality management and excellence programs.
7. Develop a new system for Good delivery and availability with flexibility in marketing demand.
8. Also, the importance of following up training outcomes and identifying strengths and weaknesses and use a training program to fill all the gabs when implementing the system and find the best way for employee promotion against the performance appraisal Moreover, do this usually.

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جامعة السودان للعلوم والتكنولوجيا

كلية الدراسات العليا

عمادة التطوير والجودة

ماجستير إدارة الجودة الشاملة والامتياز

استبانة بحث علمي

السادة: عملاء شركة الصناعات الوطنية

تحية طيبة وبعد

نضع بين أيديكم استبانه لأغراض البحث العلمي لموضوع **"أثر تكلفة الجودة على رضا العملاء لشركة الصناعات الوطنية"**

يرجى التفضل والتعاون بالإجابة على جميع العبارات الواردة في الاستبانة ونؤكد بأن المعلومات التي سيتم جمعها من خلال إجاباتكم ستحاط بالسرية التامة وتستخدم لأغراض البحث العلمي والصالح العام لذلك نأمل تعاونكم والإجابة على هذه الأسئلة بموضوعية.

الباحث:

المكي عبد الكريم المكي

م	الفقـــــرات	أوافق بشدة	أوافق	محايد	معارض	معارض بشدة
أ	**التزام الإدارة العليا بتطبيق نظام تكلفة الجودة**					
1	تلتزم إدارة شركة الصناعات الوطنية بتطبيق معايير وبرامج وأنظمة الجودة العالمية.					
2	تلتزم إدارة شركة الصناعات الوطنية بتوفير منتجات خالية من عيوب التعبئة والتغليف.					
3	منتجات شركة الصناعات الوطنية ذات					

						المحور	#
						سمعة جيدة.	
						تقوم شركة الصناعات الوطنية بتطوير منتجاتها وفقا لتوقعات العملاء.	4
						تقوم شركة الصناعات الوطنية بتحديد المنتجات المعيبة.	5
						منتجات شركة الصناعات الوطنية ذات سعر ثابت.	6
						إدارة شركة الصناعات الوطنية تعزز الاستجابة لشكاوى العملاء.	7
						إدارة شركة الصناعات الوطنية تلتزم بالسماع لمقترحات العملاء	8
						رضا العملاء عن منتجات وخدمات الشركة	**ب**
						نظم الجودة قللت ردود الفعل السلبية من المستهلكين.	9
						نظم الجودة عززت الالتزام بتغذية الأسواق بالمنتجات.	10
						نظم الجودة زادت من ثقة العملاء واساليب التعامل.	11
						المنتجات المقدمة من قبل شركة الصناعات الوطنية تلبي احتياجات المستهلكين	12
						تقدم شركة الصناعات الوطنية منتجات عالية الجودة بطريقة ممتازة.	13
						تلتزم شركة الصناعات الوطنية بجدول زمني لتوزيع المنتجات.	14
						إدارة شركة الصناعات الوطنية تشرك العملاء في وضع معايير جودة المنتجات.	15
						إدارة شركة الصناعات الوطنية تشرك	16

					العملاء في تصميم المنتجات.	
					الفوائد التسويقية	**ج**
					الفوائد التسويقية لشركة الصناعات الوطنية ناتجة من جودة المنتجات.	17
					الفوائد التسويقية لشركة الصناعات الوطنية ناتجة من توفير المنتجات.	18
					الفوائد التسويقية لشركة الصناعات الوطنية ناتجة من انخفاض تكلفة المنتجات.	19
					الفوائد التسويقية لشركة الصناعات الوطنية ناتجة من بناء علاقة طويلة المدى.	20

Paragraphs	High agree	agree	I do not know	disagree	High disagree
A- Top management's commitment to apply quality costs system					
1- National Industries Company management is committed to applying the standards, programs and systems of international quality.	1	2	3	4	5
2- National Industries Company management is committed to providing free from defects in the product packaging.					
3- National Industries Company company products are reflecting appositive quality reputation.					
4- The National Industries Company develops its products according to customer expectations.					
6- The National Industries Company select defect in their products.					
7- National Industries company products have a fixed price.					
8-National Industries Company management enhance responsiveness to customer complaints					
B- The impact of the application of quality system cost on customer satisfaction					
9- Quality Systems reduced negative feedback from consumers.					
10- Quality Systems enhance to cover market with products.					
11- Quality Systems increased customer confidence and methods of dealing.					
12-Products offered by the National Industries Company meet consumers' needs					
13- National Industries Company products offered on high quality and excellent manner					
14- National Industries Company is committed to a timetable for the distribution of products.					
15- National Industries company management allows customer to participate in building of quality standards for products					
16- National Industries company management allows customer to participate in design products					
C- marketing benefit					
17- The marketing benefits of the National Industries Company resulting from the quality products.					
18- The marketing benefits of the National Industries					

Company resulting from the products availability.					
19- The marketing benefits of the National Industries Company resulting from the low cost products.					
20- The marketing benefits of the National Industries Company resulting from Build long term relationship.					

Appendix B:

The questionnaire's referees and their jobs and places of work:

No.	Name	Job	Title
1	DR. Amera Mohamed Ali	Assistant Professor	Sudan University of Science and Technology
2	DR. Abdemutalab Ibrahim Abdelrasoul	ISO Auditor	Sudan University of Science and Technology
3	DR. Babiker Abdallah Mohamed	ISO Auditor	Petrolines For Pipes & Engineering Works Holding CO.LTD