CRITICAL FACTORS FOR SUCCESSFUL TOTAL QUALITY MANAGEMENT (TQM) IMPLEMENTATION IN MANAUFACTURING FOOD AND BEVERAGE INDUSTRY

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CERTIFICATION

This is to certify that this work contained in this **Thesis "Critical factors for successful total quality management (TQM) implementation in manufacturing in food and beverage industry** was carried out by **EKE C. SOLOMON. (201748080368)** in Partial Fulfillment for the award of the degree of Master of Science (M.Sc.) in Project Management in the Department of Project Management Technology, Federal University of Technology Owerri, Imo State, Nigeria.

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DEDICATION

This project research is dedicated to my wife Merit Eke and My daughter Chizaram Christabel Eke.

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I want to use the opportunity to thank the almighty God who made this journey a success throughout the duration of this programme and for giving me the strength to have come this far.

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ABSTRACT

The need to drive the implementation of total quality management in organization cannot be over-emphasize, hence the research on critical success factors in implementation of total quality management in manufacturing food and beverage industries. In this research, critical success factors in implementation of (TQM) total quality management is understudied and analyzed. The objective of this research study were understudied which included the following as stated,(i) Identified the critical success factors to Total quality management(TQM) implementation in manufacturing food and beverage industry (ii) Evaluated the contribution of these factors to TQM implementation and (iii) determined the impact of these factors to TQM implementation to food and beverage industry. , We were able to identify twelve independent variables and we downsized the number of variables to five, from secondary and primary data which used factor analysis technics in the reduction process. The most important variables so identified includes the following, (1) quality of food and beverage materials & additives($x_{1)}$, (2) quality of food and beverage process planning & design(x_2), (3) quality of food and beverage top management policy & supports(X_3), (4) quality of food and beverage regulatory bodies(X_4) and (5) quality of food and beverage environmental hygiene & safety(X_5).An exploratory research method was adopted, results were determined and in-depth data analysis was carried out. The significance level of the independent variables was statistically achieved. In this research, with a significance level of 0.05 and confidence level of 95%, we were able to determine the various values of t-statistics in order to rank these factors. A multiple regression analysis was adopted in the cause of this research, having determined these with an R^2 value of 0.586. With these, a multiple regression analysis model was designed to determine the impact of these independent variable against a dependent variable. From our findings we were able to identify the critical success factors in implementation of total quality management in manufacturing food and beverage industry, also the impacts of these factors so determined. However, it is noted that implementation of these success factors will increase the productive output of an organization and most especially in food and beverage industry. It is recommended that food beverage and manufacturing industry should adopt these critical success factors in total quality management implementation (TQM). The areas of recommendation for further studies includes how we can deploy a software in product management to manage different set standards in the industry and TQM software product application.

Keywords: Success factors, total quality management, and implementation.

CHAPTER ONE

INTRODUCTION

1.1 Background Information

In **t**he globalization era, quality is the most important element as a competitive source in every company or industry, Musran (2013). The pressure arising from globalization has made food and beverage industry to move towards three competitive areas, these includes quality, cost, and responsiveness which is to evaluate the critical success factors affecting total quality management implementation processes in food and beverage industry. In other to be competitive in both domestic and international market today, there is need for organization to adopt and implement robust and competitive management best practices in operations and overall business environment. These best practices include total quality management and supply chain management, (Henzer and Render (2004).

These best practices help organization to identify changes in the dynamic environment and proactively through continuous improvement aids in operation functions to achieve best performances (Cheseetal., 2005).

The need to improve performance amongst business competitors should be focused on customers' flexibility and quality. However, the management of quality should be adopted by companies in order to increase its market share value in the business environment. Conceptually, quality is the totality of the shape and characteristics of the goods that

demonstrates its ability to satisfy the needs of its apparent and hidden (Heizer and Render ,2004).

Some experts in different field have defined quality with different interpretation. Juan (1989), defines quality as for use. This interpretation, includes features of product that meets the needs and expectation of the consumers free from defects. Heizer and Render (2004) found that quality primarily affects companies in four areas.

1) Cost and market Share. According to them, an improved quality can lead to increased market share and cost savings which could also affect profitability.
2) Co-operate reputation. A responsible company follows a quality reputation provided the perception of the company is as a result of quality products or services.
3) Product Liability: Organization has a great responsibility for all resulting for the use of its product or service.
4) The international implication is the age of technology. The quality is a concern of international operations. In other for organization to be competitive, its products and services should have a desired quality and price.

The adoption of total quality management (TQM) has received varied attention over the years since inception in 1980's; Musran (2013).This has helped managers to improve on company's performance amongst competitors. Total quality management (TQM) implementation attempts to maximize the competitiveness of the organization through focus on customers satisfaction , employees involvement and continuous improvement of the quality of products , services, people, processes and organizational environment , (Krajewsk etal., 2003)

Total quality management (TQM) plays significant role in enhancing the strength of enterprise competitiveness, (Sila *et al.* ,2007). In other to help organization remain competitive, the adoption of TQM is an important approach for them to improve quality products, product cost, and increase in productivity.

Implementation of TQM has a positive impact on revenues and production cost (Gaspaz 2005). Other evidence also suggest that companies that pursues best practices of TQM to achieve higher profits and shareholder value as well records higher cash flows , Corbett and Restrick,(2000).However, there are critical success factors which are unavoidably unique for total quality management implementation in organization in other to visibly improve company's performance output. There are empirical studies, that have been carried out previously by researchers that contribute extensively to the overall performance of organizations. Examples includes Rahman (2001), conducted a study of 53 Australian SMES and found out that the critical success factors in TQM implementation are leadership, strategy and planning, employee engagement , employee training and development , information and analysis and customer satisfaction.

Demirbag *et al* (2006) conducted an empirical study to identify the critical success factors of TQM of SMES in Turkey, the results show that these were CSFs of TQM practices i:e The quality of data and reporting, the role of top management , employee relations, Supplier , quality management , training , quality polity and management processes.

Prayogo and Hong (2008) conducted a study in 130 industrial, manufacturing, research and development in Korea. They found that the implementation of TQM has significant effect

on performance. However, based on these above researches, the aim of this study is to determine the critical success factors in TQM implementation in manufacturing food and beverage industry in Nigeria with Coca cola as a case study.

1.2 Problem Statement

Quality management implementation differs from project to project and from company to company but the aim of quality consciousness remains to satisfy consumer needs. In so doing, inadequate and inefficient quality management systems in food and beverage industry has led to shortcomings in corporate objectives like continuous improvement cost minimization, market share retention, profit maximization etc. due to high level of rejects, retest, rework, customer complain and low market competitiveness of the product. The limited study in research with African in this areas spurred the need to have a setting that some of these products and services are consumed. Most researches in these areas are foreign hence the need to develop solutions with Africa environment in mind and precisely Nigeria.

However, with the intention to fill this gap as a result of limited studies in this area of research which is incongruent with our own environment in Africa, we deemed it to really identify factors that culturally affect our own industry and projects located in Nigeria. Successful implementation of TQM in many of our societies and companies are becoming difficult, Quaisa and Rizwana (2015), hence we established a need to carefully identify the critical factors to be wholly considered in other to reduce cost and time. Despite adoption of quality management techniques by NBC further from the year 2015 until early 2020

the company recorded decline in sales, Nairametrics (2008) but according to its management, other competitors so identified in the industry kept recording increasing volume of sales in spite of the competitive and tough business environment in Nigeria . Here the company seeks to ascertain the most critical success factors to be considered in its production processes in other to enhance profitability. This necessitated the need to conduct routine quality auditing of the quality management systems of its company in the industry and identify the most critical success factor in TQM implementation.

Some food businesses have little motivation to implement their quality management system beyond paper work largely due to their business philosophy and the belief that they always produce safe food for the customer or consumers. Hence COPQ (Cost of poor quality) of customers suffer from time and cost overrun with quality short of expectation. However, in the wake of numerous global food safety incidences, the recent evolution of stringent litigations, scarcity of raw materials, corporate competitions, and the current drive for eco-friendly production processes, the adoption of formidable quality management systems in all food and beverage industries and their allied companies must periodically appraise their quality consciousness by evaluating critical factors in implementation of TQM such as: quality of raw materials and additives, top management policies and support, their process planning and design, demands of regulatory bodies, environmental hygiene and safety, product mix, storage and packaging, intensity of competition, customer needs and expectations, technological opportunities, roles of information technology in quality management, socio-economic and political factors mandatorily in order to maintain their markets shares and profitability. This study will serve as a benchmark to evaluate the

critical success factors in implementing TQM in management processes and product life cycle in food and beverages industry.

1.3 Objectives of Study

The aim of this study is stated below

. The Specific Objectives includes the following under listed below

i. To identify the success factors to total quality management implementation (TQM) in manufacturing food and beverage industry.

ii. To evaluate the contribution of these success factors to TQM.

iii. To determine the impact of these factors to total quality management in manufacturing food and beverage industry.

1.4 Research Questions

i. What are the critical success factors to the implementation of TQM in manufacturing food and beverage industry?

ii. How do these critical success factors contribute to TQM implementation in manufacturing food and beverage industry?

iii. To what extent do these success factors contribute to TQM implementation in manufacturing food and beverage industry?

1.5 Research hypothesis

In order to achieve the objectives of this research, the following hypotheses were formulated.

a) H_{01}: These success factors do not contribute to Implementation of TQM in food beverage and manufacturing industry

b) H_{02}: The critical Success factors are not significant.

c) $H_{03:}$ What is the magnitude and direction of these critical success factors?

1.6 Justification of Study

The study is based on the philosophy that TQM implementation is vital to improve organizational production processes hence its products life cycle for customers' benefits. The end product is a quality production that will satisfy customers' needs as per product requirements.

The study is necessitated as a result of the concern by companies to achieve optimal performance of their product and service in the market. The growing demand for quality and product performance from the arrays of companies globally and the need to hire the right workforce and train them to acceptable level with the least cost in mind as a strategic company policy in recruiting the most competent staffs and the right method of training.

The study aims to give guidance to companies most especially in the beverage industry, what critical success factors to consider for optimal product performance and reliability in the market amongst competitors.

This study is therefore focused on the critical success factors to implementation of total quality management (TQM) in production processes to enhance organization output performance. The empirical and conceptual reviews of researchers shall give insight towards the critical success factors for the implementation of total quality management

(TQM) which unavoidably should be adopted for processes improvement and product acceptability to customers to enhance Profitability. This whole research studies, however gives a concretized and adaptable improvement processes for which organizations especially food beverage & manufacturing project companies in this era of competitiveness could draw unquantifiable benefits should it be implemented to the later. This work however invariably would help managers, senior company executives in the manufacturing, service and process industries in decision making when considering cheap and productive avenues to implement TQM. The academia is not left out in benefitting from the enormous effort put in this research work as students would see it as a guide in further studies.

1.7 Scope of Study

This study is limited to the processes, techniques, procedures and methods of identifying the critical success factors in implementation of total quality management(TQM) for continuous processes improvement and products life cycle acceptability amongst customers with attention to Coca-Cola products as a case study.

The Collection of data would be from different NBC Plants which are Owerri Plant and Port-Harcourt Plant where questionnaires shall have sampled among different categories of staffs which includes technical staffs, management staffs, and mid-level staffs. These Coca Cola Plants are domiciled in the South East and South -South Part of Nigeria. This research is a case study of food, beverage and manufacturing industry where we would identify critical success factors in implementation of TQM and determine their impacts for

which they would be considered for successful implementation .The variables of interest includes the following

1. Quality of Raw Materials/Additives
2. Top Management Policy and Support
3. Process Planning and Design
4. Regulatory Bodies
5. Environmental Hygiene and Safety
6. Information Technology
7. Product Mix
8. Storage and Packaging
9. Customer Needs and Expectations.
10. Technological Opportunities
11. Intensity of Competition.
12. Socio-Economic and Political Factors

During the collection of this questionnaire a feedback period of two weeks would be exhausted to collect reports from the respondents. In both Plants, the impact variables and the impacted would be analyzed and conclusion would be made on how significant they are and at what conformance level.

However, this study is necessitated as a result of reports from the management of the NBC Nigeria who were concerned in 2018 the resulting decline in sales despite company's adoption of quality management policies over the years in Nigeria and beyond Nairametrics (2008).

CHAPTER TWO

LITERATURE REVIEW

2.1 Conceptual Review of TQM

Quality is perceived differently by different people from divergent understanding. Yet, everyone understands what is meant by "quality."

In a manufactured product, the customer as a user recognizes the quality of fit, finish, appearance, function, and performance, (Tirupathi, 2003). In continuation, he expressed that the customer's needs must be translated into measurable characteristics in a product or service as the ultimate aim is to ensure that the customer will be satisfied to pay for the product or service. This should result in a reasonable profit for the producer or the service provider. The relationship with a customer is a lasting one. The reliability of a product plays an important role in developing this relationship. In line with this argument, United Nations Industrial Development Organization, (2006), stated that the quality of a product may be defined as "its ability to fulfill the customer's needs and expectations".

Tirupathi, (2003), attributed that "Quality is conformance to requirements" Quality according to Deming (2006) means a predictable degree of uniformity and dependability with a quality standard suited to the customers. American Society for Quality (ASQ) defined quality as an excellence in goods and services, especially to the degree they conform to requirements to satisfy customers. Deming (2006) concluded by stating that the widely accepted definition is the degree to which performance meets expectations. In his contribution, Besterfield (2004) defined quality as the totality of characteristics of an entity that bears on its ability to satisfy stated or implied needs. However, total quality

implementation is one indispensability in manufacturing organization that cannot be overemphasized. The need for beverage industries to adopt quality implementation processes and procedures is one thing that helps them to improve and increase market share value especially in a market competitive environment. However, system of management should be structured within business to obtain better results. Ishikawa (1987) shows that the best results are generated by combining a variety of quality tools instead of their single use.

Cosby (1979) stated that" quality is free" and emphasized prevention and defined program of 14 steps of quality improvements through philosophy of zero defects. Deming (1986) argued that the case of poor quality is the system and not employee. He therefore stated that top management should understand and see the company as a complex system. He emphasized accordingly that statistical techniques should be adopted and proposed 14 principles or points for effective quality management organizations.

Feighenbaun (1991) described the idea of total quality, recognizing that quality was not just a collection of tools and techniques but supported the introduction of statistical techniques and processes within the company or organization. He however described 10salient critical bench marks to successful implementation of total quality control.

Gyna and Juan (1998) however advocated a concept that is based on improving quality performance to unprecedented level. Juan (1989) offered three sets of process, quality planning, quality improvement and quality control as a frame work for total quality management (TQM) and was one of the first to measure the cost of quality. TQM has its origin in Japan from its scientists and engineers Hamilton and Auri (2010). This was

formed by a committee set up in 1949 to improve Japanese productivity and increase quality of life after the world II war (Powell,1995).

Mohman (1995) defined TQM as an approach to the management of an organization which emphasizes continuous quality improvement and customer satisfaction. This however implies the application of tools and systematic approaches to managing organization processes. With these in mind, it involves the creation of structures such as quality teams and boards to keep focus on company's core objectives and approve procedures for organizational profitability.

Common themes such as customer focus, continuous improvement and process management, use of scientific tools commitment to leadership and human resource management are the critical factors for TQM (Sila and Ebrahimpur, (2003). Accordingly, these critical factors are constructed as part of Baldridge Quality Model in the USA and was tested over 20 years ago.

In Brazil there is a National Quality award created by the national foundation in 1991, Hamilton and Auri (2010). According to them, the award covers the eight evaluation criteria in a system of TQM which are Leadership, strategies and plan, customers, society, information and Knowledge, People, process and outcome. These criteria are based on 11 grounds such as System thinking, organizational learning. Culture and innovation, Leadership and constancy of purpose, guidance and process information, future vision and value generation, Valuing timing, Knowledge about the customer, and market development partnership and social responsibility, (National Quality foundation 2012).

However Food and beverage industry as a result should try as much as they could to adopt these procedures and policies to fully integrate their processes to TQM implementation in other to take advantage of its enormous advantages for profitability especially now that the business world is facing series of competitiveness from business as result of global decline in the market share value with recent entry of many competitors.

2.2 Theoretical Review of TQM

Total quality management (TQM) is a quality improvement body of methodologies that are customer based and service oriented

Bright Hub (2010). However, TQM may refer to set of customer based best practices that intend to improve quality and process improvement, there are several different theories at work guiding TQM best practices. These includes but not limited to the following under listed theories.

2.2.1 Deming's theory

Deming's theory of total quality management rests upon fourteen point of management which he identified, the system of profound knowledge and the shewart cycle (Plan to do Check list) Bright Hub (2010). He is known for his ratio. According to him, Quality is equal to the result of work efforts over the total cost. If a company focuses on costs, the issue is that there may be reduced cost with decreasing quality. Deming's system of profound knowledge consists of the following four points

- System Appreciation- An understanding of the way the company's process and system works
- Variation Knowledge- An understanding of the variation occurring and causes of the variation
- Knowledge theory- The understanding of what can be done
- Psychology Knowledge- The understanding of human nature by being aware of the different types of knowledge associated with an organization then quality can be discussed as a critical topic.

The Fourteen points of Deming theory of TQM are as follows

1. Creating Constancy of purpose
2. Adopt new philosophy
3. Stop dependency on mass inspection
4. Don't award business based on price
5. Aim for continuous production and service improvement
6. Bringing cutting edge on the job training
7. Implement cutting edge method for leadership
8. Deconstruct departmental barriers
9. Abolish fear from company
10. Get rid of quality based work goals
11. Get rid of quotas and standards
12. Support pride of craftsmanship
13. Ensure everyone is trained and educated
14. Make sure the top management supports other 13 goal

The “Plan to Do Check list” is a continuous improvement technique adopted in Project planning phase where objectives and actions are outlined before implementation.

2.2.2 Crosby’s Theory

Phillip Crosby is another person credited with starting the TQM movement

Bright Hub (2010), He made the point much like Deming, that if you spend on quality, it is money that is well spent. Crosby based on four absolute quality management and his own list of fourteen steps to quality improvement. The four absolutes include

- We define quality as adherence to requirements
- Prevention is the best way to endure quality
- Zero defects(errors) is the performance standard for quality
- Quality is measured by the price of non-conformity.

The fourteen steps to continuous quality improvement by Crosby are follow Bright hub (2010)

1. Attain total commitment from management
2. Form a quality improvement team
3. Create metrics for each quality improvement activity
4. Determine cost of quality and show how improvement will contribute to gains
5. Train supervisors appropriately
6. Encourage employees to fix defects and keep issues logs
7. Create a zero-defects committee
8. Ensure that employees and supervisors understand the steps to quality
9. Demonstrate your company’s commitment by holding a zero defects day

10. Goals are set on 30, 60, or 90-day schedule
11. Determine root causes of errors, remove them from processes
12. Create incentives programs for employees
13. Create a quality council and hold regular meetings
14. Repeat from step one

2.2.3 Juan's Theory

Joseph Juan is responsible for what is known as quality "trilogy". The quality trilogy is known as quality planning, improvement and quality control, BrightHub (2010). If a quality improvement project is to be successful, then all quality improvement actions must be carefully planned out and controlled. Juan believed that they were 10 steps to quality improvement. These are listed below

1. An awareness of the opportunities and needs for improvement must be created
2. Improvement goals must be determined
3. Organization is required for reaching the goals
4. Training needs to be provided
5. Initialize projects
6. Monitor progress
7. Recognize performance
8. Report on results
9. Track achievement of improvements
10. Repeat

2.2.4 The EFQM Framework

The European Foundation for Quality Management (EFQM) Model is based upon nine criteria for quality management. There are five enablers (criteria covering the basis of what a company does) and four results (criteria covering what a company achieves) Bright hub (2010). The result is a model that refrains from prescribing any one methodology, but rather recognizes the diversity in quality management methodology.

The nine criteria include the following

1. Focus on Results - pleasing company stakeholders with results achieved by stakeholders is a primary focus.
2. Focus on Customers - it is vital that a company's quality management leads to customer satisfaction.
3. Constancy of Purpose and Consistent, Visionary Leadership
4. Process and Facts form the Management Focus - Management breaks down everything into systems, processes and facts for easy monitoring.
5. Training and Involving Employees - Employees should receive professional development opportunities and be encouraged to remain involved in the company
6. Continuous Learning - everyone should be provided with opportunities for learning on the job
7. Developing Partnerships - It is important to encourage partnerships that add value to the company's improvement process
8. Social responsibility of the cooperation-The company should always act in a way where it is responsible towards the environment and society at large

2.2.5 Ishikawa's Theory

Creator of the last theory, Dr. Kaoru Ishikawa is often known of his name sake diagram BrightHub (2010). He also developed a theory of how companies should handle quality improvement projects. Ishikawa takes a look at quality from human standpoint. He stated that there are seven basic tools for quality improvement. These tools are

- **Pareto Analysis** - This helps to identify the big problems in a process.
- **Cause and Effect Diagrams**. This equally help to get to the root cause of problems.
- **Stratification** - Stratification analyzes how the information that has been collected fits together.
- **Check Sheets** - Check sheets look at how often a problem occurs.
- **Histograms**. To monitor variation.
- **Scatter Charts** - Scatter charts demonstrate relationships between a variety of factors.
- **Process Control Charts** – A control chart helps to determine what variations to focus upon.

Toyota motors is one of the prominent companies in the world who have consistently adopted TQM implementation in its production and process improvement. It has successfully deployed these theories in its 75-year history.

It has received numerous awards in TQM and Quality control. One of such is Deming application price in 1965 and Japan quality control award in 1970.

For Toyota TQM is based on customer first" kaizen" meaning continuous improvement and total participation which also means involvement and total participation of employees.

In 1949 Toyota was the first to introduce "Statistical Quality Control"

Recently is the introduction of another robust theory which is called the "Six sigma", a quality control technique by Motorola.

2.2.6 SIX SIGMA

Six Sigma(6σ) is a set of technique and tools for process improvement. Wikipedia(2020). It was introduced by American engineer Bill Smith while working with Motorola in 1986. A six sigma process is one which is 99.99% of all opportunities to produce some feature of a part which are statically expected to be free of defects. It therefore seeks to improve manufacturing quality by identifying and removing causes of defects and minimizing variability in manufacturing and business processes. It does these by using empirical and statistical quality management methods and by hiring people who serve as six sigma experts. Each six sigma project follows a defined methodology and as such has specific targets.

Six sigma is known to have been applied in Manufacturing, Healthcare, Engineering and construction, Finance and supply chain.

Let us suffice ourselves to the above listed TQM theories as there are other competing theories which are not mentioned therein in the course of this research.

2.3 EMPERICAL REVIEW OF TQM

TQM implementation is observed to have over the years improved organization's production output and in process management decision, however there are empirical studies linking TQM and performance and these have been carried out by previous researchers. For example Rahman and Bullock (2005), Lewis, Pun and Lala(2006) identified Leadership, customer focus, quality culture, teamwork, training, communication, product design and employee involvement as critical success factors in implementation of TQM.

Rahman (2001) conducted a study of 153 SMES in Australia and found that the critical success factors of TQM implementation are leadership, strategy and planning, employee empowerment, employee engagement , employee training and development, information and analysis, customer management as Critical success factors in TQM implementation.

Demurbag (2006) also conducted an empirical study to identify the critical success factors of TQM implementation in SMEs in Turkey. Accordingly, the result shows a seven Critical success factors implementation and these included the quality of data and reporting, the top management, employee relation, supplier quality management, training, quality policy and management processes. Pryogo and Hong (2008) equally conducted a study of 130 industrial research and development in Korea and discovered that TQM implementation has quality impact in performance output in organization. However, these studies have limitations in identifying the critical success factors in TQM implementation in food, beverage and manufacturing industry.

In this our study shall critically analyze the critical success factors in implementation of TQM in food, beverage and manufacturing industry in Africa and most especially Nigeria.

2.4 Analytical TQM Literature Review

2.4.1Quality Management System.

Quality management is a collection of business processes focused consistently of meeting customers' requirements and enhancing satisfaction. Wikipedia, (2021). It is aligned with an Organisations purpose and strategic direction (ISO 9001:2015). It is equally expressed as the organizational and aspirations, policies, processes, documented information and resources needed to implement and maintain it. Earlier than now in the 20th century, labor typically was the costly input of focus in developed societies now major focus has been shifted to team cooperation and dynamics especially the early signaling of problems through continual improvement cycle. In the 21st century, QMS has tended to converge with sustainability and transparency initiative as both investor and customer satisfaction and perceived quality is increasingly tied to these factors, Wikipedia (2021).

The ISO 9000 family of standards is probably the most widely implemented worldwide. The ISO19011 audit regimes applies to both, and deals with quality and sustainability and their integration.

The term "Quality management system and the initialism "QMS" were invented by Ken Croucher, a british management consultant working on designing and implementing a generic model of QMS within the IT industry, Wikepedia,(2021).

Ali and Abedalfattah, (2013) defined Quality management as a set of guiding principles and management styles that have been adopted by managers in organizations to improve competitiveness and organizational performance.

Such principles include the popular Total Quality Management (TQM) which is a management philosophy that seeks to integrate all organizational functions of management and to focus on continuously improving the quality of products and processes so as to meet customer needs and organizational objectives.

QMS can also be expressed as the organizational structure, procedures, processes and resources needed to implement quality management according to (Slogan, 2004). QMS has tended to converge with sustainability and transparency initiatives, using conventional and simple statistics and random sampling as both investor and customer satisfaction and perceived quality is increasingly tied to these factors.

Benefits of Quality Management System

Implementing quality management system affects every aspects of an organization performance.

The benefits of quality management system include the following:

- Meeting the customer's requirements which helps to instill confidence in the organization
- Meeting the organizations requirements which assures compliance with regulations and provision of products and services in the most cost and resource efficient manner, creating room for expansion, growth and profit

These benefits offer additional advantages including the following:

- Defining, improving and controlling processes

- Reducing wastes
- Preventing mistakes
- Lowering costs
- Facilitating and identifying training opportunities
- Engaging staffs
- Setting organization –wide direction
- Communicating a readiness to produce consistent results.

2.4.4 Concepts of Quality Management System

The concept of quality management system includes the following under listed

- Recognize interested party requirements including licenses to trade, guideline customer requirements and chosen management system standards
- Ensure that all requirements have been meet
- Confirm that employees receive applicable training in the quality system requirements
- Produce record or evidence that system requirements have been met
- Measure, monitor and report the performance of the QMS
- Plan changes to the QMS and take actions to address risk and opportunities as a result of the change
- Continually improve the QMS.

There are nine core elements of Quality management system. The use of management frame works to ensure consistent quality is not new but the main purpose of quality systems has evolved in recent years. Life science organization and others use QMS frame work to guide process, efficient, optimized continuous improvement efforts and adopt data

evidence based decision making. Organization and highly regulated industries such as Engineering, medicine, Pharmaceuticals globally adopt quality standards like ISO 9001 to improve quality through transparency, documentation and systematic approaches to improvements. However, the modern adoption of Quality management software typically supports modern quality management systems.

The quality management systems many science and project management companies needs certain core objectives in other to reap maximum benefits of that system. These includes the following:

i. Quality policy and objectives
ii. Quality Manual
iii. Organizational structure and responsibility
iv. Data Management
v. Processes
vi. Customer satisfaction and product quality
vii. Continuous improvement
viii. Quality instruments
ix. Documents and control managements

2.4.4.1 Components of QMS

There are four main components of quality management system these includes the following

1. Quality control Planning: identifying your quality goals , standards and requirements necessary to meet up the standards

2. Quality Control: The process of physically inspecting and testing what you laid out in the planning stage
3. Quality Assurance: Reviewing delivery process of service or quality management of delivery of goods
4. Quality Improvement: Thorough review of findings from the last three components and come up with ways to improve your methods going forward

2.4.4.2 Types of quality management systems standards

The different types system standards vary from industry to industry and every industry depend on the standards to be adopted as such included are the following quality management standards that are used

a) All industry standards: ISO 9001
b) Automotive industry: IATF 16949
c) Medical device: ISO 13485
d) Food: ISO 22000
e) Services: ISO2000000
f) IT: ISO27001
g) Aerospace: AS9100

2.4.5 Quality Standards

Quality standard helps buyers and sellers trade on agreed- upon quality levels. Uniform standards are quality driven and provide a foundation to provide identification, measurement and control of quality characteristic important to the marketing function. In addition, they provide a common language for marketing, a means of establishing the value

or basis for prices, and a gauge of consumer acceptance. Quality standard help ensure food quality. These standards include:

i. Research standards: set up by a company to help ensure the quality of its products in a competitive market.

ii. Trade standards: established by members of an industry. These are voluntary and assure at least minimum acceptable quality.

iii. Government standards: grade standards by the government to provide a common language for producers and consumers for buying and selling.

The appropriate method of implementation of quality systems will depend upon such characteristics as the type of product, it complexity, regulatory requirements that must be satisfied for legal reasons and size of supplier organization, (Slogan, 2004).

One important benefit of the non-prescriptive character of the ISO 9000 standards-in particular is across- the board applicability to all organizational structures. The requirements of ISO 9001 are equally relevant whether the supplier organization is large or small, or has one site or many. At a long run, both local and international quality standards have helped tremendously to secure and safeguard consumer interest in terms of the final food product as it moves from the farm until it reaches the consumers for consumption.

2.4.6 The Facets of Product Quality

The guideline standard ISO 9000-:2008 explains many concepts that are fundamental to the ISO 9000 family. Among these is the concept of the four facets of product quality.

1 Quality due to definition of needs for the product which defines and updates the product to meet market place requirements and opportunities.

2 Quality due to product design. Designing into the product the characteristics that enable it to meet market place requirements and opportunities. Features that influence intended functionality and robustness of product performance under variable conditions of production and use.

3 Quality due to conformance to product design.

4 Quality due to product support throughout the product life cycle.

These four facets encompass all stages of the product life cycle.

2.4.7 Total Quality Management

The TQM concept was developed by a number of American management consultants, including W. Edwards Deming, JoesephJuran, and A.V. Feigenbaum (2020). Originally, these consultants won few converts in the United States. However, managers in Japan embraced their ideas enthusiastically and even named their premier annual prize for manufacturing excellence after Deming. It originated in the 1950′s and has steadily become more popular since the early 1980′s.

Total Quality Management, (TQM) as defined by Sloan, (2004) is a management philosophy that seeks to integrate all organizational functions of management and employees (marketing, finance, design, engineering, and production, customer service, etc.) to focus on continuously improving the quality of products and processes so as to meet customer needs and organizational objectives. As Nagarajan, (2012) explained that it is a modern quality improvement concept that deals with a product in its totality through the efforts of all concerned with its production such as the design department, research &development, production, manufacturing, engineering, human resource, procurement,

quality control, sales, marketing department etc. In the past 10 or 20 years a few companies have radically transformed their business performance. The successes of these companies have dramatically changed how they and others see both quality and business management today. Total Quality Management is a combination of quality and management tools aimed at increasing business prospects and reducing losses due to wasteful practices. TQM functions on the premise that the quality of products and processes is the responsibility of everyone who is involved with the creation or consumption of the products or services offered by an organization.

In other words, TQM capitalizes on the involvement of management, workforce, suppliers, and even customers, in order to meet or exceed customer expectations, however, it is viewed in an organization as a collection of processes. It maintains that organizations must strive to continuously improve these processes by incorporating the knowledge and experiences of workers. TQM is a description of the culture, attitude and organization of a company that strives to provide customers with products and services that satisfy their needs. The culture requires quality in all aspects of the company's operations, with processes being done right the first time and defects and waste eradicated from operations. The simple objective of TQM is "Do the right things, right the first time, every time".

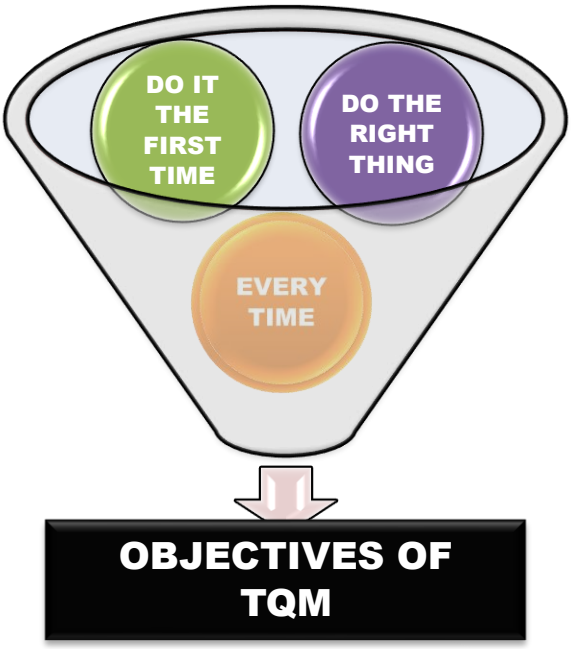

Figure 2.1: Objective of TQM (Adapted from Sloan, (2004).

TQM is infinitely variable and adaptable. Although originally applied to manufacturing operations, and for a number of years only used in that area, TQM is now becoming recognized as a generic management tool, just as applicable in service and public sector organizations.

2.4.8 The Concept of Continuous Improvement in TQM

TQM is mainly concerned with continuous improvement in all work, from high level strategic planning and decision-making, to detailed execution of work elements on the shop floor with the sole aim of customer satisfaction once and always. It leads to continuously improving results, in all aspects of work, as a result of continuously improving capabilities, people, processes, technologies and machine capabilities. Continuous improvement must deal not only with improving results, but more importantly with improving capabilities to

produce better results in the future. The five major areas of focus for capability improvement are demand generation, supply generation, technology, operations and people capability.

Total quality management system forms the belief that mistakes can be avoided and defects can be prevented. A central principle of TQM is that mistakes may be made by people, but most of them are caused, or at least permitted, by faulty systems and processes. This means that the root cause of such mistakes can be identified and eliminated, and repetition can be prevented by changing the process.

There are three major mechanisms of defect control according to Besterfield, (2004):

1. Preventing mistakes/defects from occurring (Mistake – proofing).
2. Detecting by Inspection at source or by the next operation. Where mistakes can't be absolutely prevented, detecting them early to prevent them being passed down the value-added chain.
3. Stop in time: Where mistakes recur, stopping production until the process can be corrected, to prevent the production of more defects. This is shown in figure 2.3 below:

Figure 2.2: Three Mechanisms of Defect Control (Adapted from: Besterfield, 2004)

2.4.9 Quality Management Processes

Three important aspects of Quality management system consist of quality planning, quality assurance and quality control as shown in fig. 2.5:

Figure 2.3: Quality Management Processes (Source: Garvin and Artemis, 1981)

These three processes should be applied in every stage of production project in food and beverages industry for effective and efficient competitive and economic performance.

2.4.10 Quality Planning

Garvin and Artemis, (1981) reported that quality planning is a systematic process that translates quality policy into measurable objectives and requirements and lay down a sequence of steps for realizing them within a specified period.

It involves identifying which quality standard to apply to the project and determining how to satisfy them. It is one of the keys facilitating processes during project planning and should be performed regularly in parallel with other project planning processes.

Also, it is a process of identifying and scheduling the other Quality management process, that is, quality assurance and quality control activities in other to improve the level of quality within a time frame.

Quality planning provides the process, methods, tools and techniques for closing each of these component gaps and thereby ensuring that the final quality gap is at minimum.

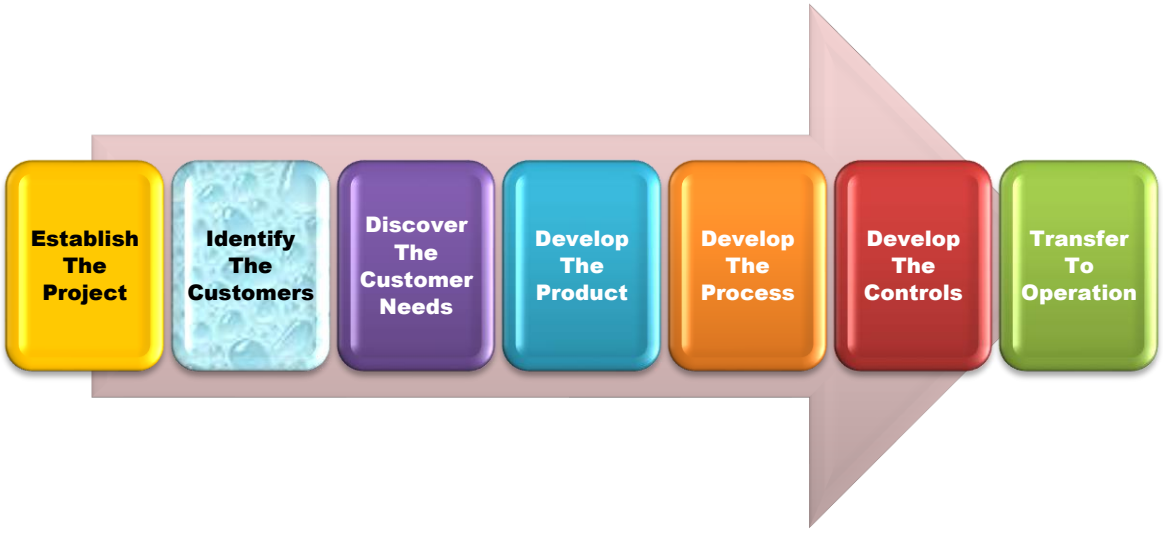

Figure 2.4: Steps of Quality planning (Source: Garvin & Artemis, 1981)

The first step, establish the project, provides the clear goals, direction and infrastructure required if the constituent quality gaps are to be closed. The next step provides for systematic identification of all the customers. It is impossible to close the understanding gap if there is the least bit of uncertainty, fuzziness, or ignorance about who all the customers are.

The discovery of customer needs in the third step provides the full and complete understanding required for a successful product design to meet those needs. It also evaluates customer perceptions explicitly so that the final perception gap can be avoided.

The develop product step uses both quality planning tools and the technology of the particular industry to create a design that is effective in meeting the customer needs,

thereby closing the design gap. Quality planning techniques ensure that the process is capable of delivering the product as it was designed, consistently, time after time.

Finally, the operation gap is closed by the developing process controls that keep the process operating at its full capability. Successful elimination of the operations gap also depends on an effective transfer of the plans to the operating forces. A strong transfer of the plan, executed well, will provide operations with all the processes, techniques, materials, equipment, skills and so on to delight customers on a continuing basis.

2.5 Quality Assurance

According to Microsoft® Encarta® 2009, the word "assurance" is synonymous to "Guarantee" and means "a state of confidence in ability or status. However, quality assurance can be defined as the state of confidence conferred on a product to guarantee its fit for its intended use.

Quality assurance according to Sloan (2004), involves the procedures and steps taken for measuring, improving, and maintaining the quality of any human activity that has a value. It refers to the engineering activities implemented in a quality system so that requirements for a product or service will be fulfilled. It is the systematic measurement, comparison with a standard, monitoring of processes and an associated feedback loop that confers error prevention. Quality assurance is a means of ensuring that the best practices are encouraged in a social system. As a result of this, quality assurance principles are to be used as indicators to ensure compliance.

Quality assurance as earlier stated is a structural approach to business management and control which embraces the ability to consistently provide products and services to

specification. It secures the intended confidence by derivable from a product thereby making it free from uncertainties and deviations from stated specifications. Quality systems are intended to implement the desired objectives and make quality part of every activity within the business and every one's responsibility. It checks whether the various stages of process of serving the customers have been conducted correctly and any defects identified have been corrected. Assurance may be provided to the project management team and the management of the performing organization. Inputs to quality assurance are quality managements plan, results of quality control measurement and operational definition. Output of quality assurance is quality improvement. Suitable quality is determined by product users, clients or customers, not by society in general. It is not related to cost and adjectives or descriptors such as "high" and "poor". For example, a low-priced product may be viewed as having high quality because it is disposable where another may be viewed as having poor quality because it is not disposable.

Quality assurance, in its broadest sense, is any action taken to prevent quality problems from occurring. In practice, this means devising systems for carrying out tasks which directly affect product quality.

A simple example of quality assurance is a cooking recipe. A recipe is a system for preparing a particular dish. It describes the additives and utensils necessary to prepare the food, the method of cooking it, how to test when it is ready, how to store it, and how to serve it. Cooking recipe produces better and more consistent results. And the same applies to using systems in other situations.

Two principles included in Quality Assurance are: "Fit for purpose", the product should be suitable for the intended purpose; and "Right first time", mistakes should be eliminated the first time they are identified. Quality Assurance includes management of the quality of raw materials, assemblies, products and components, services related to production, and management, production and inspection processes.

Barriers to the Adoption of Quality Assurance System in the Food and Beverages Sector

Poor management support and support participation is very evident: For most small to medium sized food enterprises, the adoption of one or more quality assurance (QA) programs requires owner-managers to embark upon a completely new way of managing food safety and food quality. There is also little or no motivation, most food businesses have little motivation to implement QA programs largely due to their business philosophy and culture and the belief that they already produce safe food. However, in the wake of numerous global food safety incidences, the adoption of QA programs is becoming mandatory in order to access markets and protect businesses from potential litigation, slogan (2004). There is also the element of Ordering / purchasing quantities: The size, frequency and the facility's location relative to the supplier affect how much lead time the supplier requires before a delivery can be made which indirectly affect the quality assurance of the raw materials procured.

Quality and sanitation standards must also be considered in ordering / purchasing. A poor quality or unsanitary product is never a bargain, no matter how inexpensive it is.

Knowledge of food production methods and competitors is critical to the success of any good quality assurance program (Garvin and Artemis, 1981).

2.6 Quality Control

In accordance with Microsoft® Encarta® 2009, the word "control" is synonymous to the following words: "limit, constrain, restrict, restrain, regulate and check" it also means "to restrain or restrict something to a limit". Henson and Hooker (2001), defined Quality control as a process through which a business seeks to ensure that product quality is maintained or improved and manufacturing errors are reduced or eliminated. Quality control requires the business to create an environment in which both management and employees strive for perfection. According to Juran (1988), "Quality control is the regulatory process through which we measure actual quality performance, compare it with standards, and act on the difference." In a like manner, Bartelsman, *et al.* (2000) described quality control as a process that is used to ensure a certain level of quality in a product or service which might include whatever actions a business deems necessary to provide for the control and verification of certain characteristics of a product or service. Bartelsman and his group emphasized that most often; it involves thoroughly examining and testing the quality of products or the results of services.

The basic goal of this process is to ensure that the products or services that are provided meet specific requirements and characteristics, such as being dependable, satisfactory, safe and fiscally sound. Companies that engage in quality control typically have a team of workers who focus on testing a certain number of products or observing services being

done. The products or services that are examined usually are chosen at random. The goal of the quality control team is to identify products or services that do not meet a company's specified standards of quality. If a problem is identified, the job of a quality control team or professional might involve stopping production or service until the problem has been corrected, (Juran, 1988).

Andaleeb and Caskey (2007) saw quality control (QC) as a procedure or set of procedures intended to ensure that a manufactured product or performed service adheres to a defined set of quality criteria or meets the requirements of the client or customer. Henson and Hooker (2001), stated that a major aspect of quality control is the establishment of well-defined controls. These controls help standardize both production and reactions to quality issues.

Based on these definitions, quality control can be seen to be similar to, but not identical with, quality assurance which has been defined as a procedure or set of procedures intended to ensure that a product or service under development (before work is complete, as opposed to afterwards) meets specified requirements. Quality assurance (QA) is sometimes expressed together with quality control (QC) as a single expression, quality assurance and control (QA/QC).

Quality control consists of all those activities, which are designed to define, maintain, limit and restrict specific quality of products within reasonable limits. Quality control involves monitoring specific project results to determine if they comply with relevant quality standards and identifying ways to eliminate causes of unsatisfactory results. It should be

performed throughout the project. Project results include both product results such as deliverables and management results such as cost and schedule performance. The project management team should have a working knowledge of statistical quality control, especially sampling and probability to help them evaluate quality control outputs. Quality control inputs are work results, quality management plan, operational definition checklists. Outputs of quality assurance are quality improvement, acceptance decision, rework, completed checklist and process adjustment.

Thus, quality control is the systematic regulation of all variables affecting the goodness of the end product. In other words, quality control involves determination of quality standards and measurement and control necessary to ensure that the established standards are practiced and maintained. It does not attempt to achieve the perfect quality but to secure satisfactory or reasonable quality at a reasonable and competitive level of cost through a systematic control over the variables in the manufacturing process, variations in the quality of the product can be kept reasonably stable (Andaleeb & Caskey, 2007).\

2.6.1 Significance of Quality Control

In today's competitive environment the mere success and survival of any enterprise whether it is a small-scale unit or large-scale enterprise depends upon the achievement and maintenance of a satisfactory level of quality.

Quality control offers several advantages (Henson & Hooker 2020).

a. It helps to improve the brand image of the enterprise.

b. It facilitates standardization.

c. It helps to reduce costs by cutting down wastes caused by the production of defective products.

d. It helps to increase sales turnover.

e. It enables the entrepreneur to face competition more effectively in domestic as well as international markets.

f. It helps the entrepreneur to determine costs and prices at competition levels in advance of production.

g. It enables the manufacturer to comply with quality standards prescribed by the government.

Methods of Quality Control: Traditionally, there are two methods of quality control which are: Inspection and Statistical quality control.

a. **Inspection:** - There are three important aspects of inspection.

b. **Process inspection:** - It is designed to check raw material, machines etc. It saves time and wastage of material and prevents process bottlenecks.

c. **Product Inspection**: - It is to ensure that goods sent into the market for sale are free from defects and conform to the set standards of quality.

d. **Inspection Analysis:** - careful analysis of inspection results which help in locating the critical points in the process at which control is breaking down.

e. **Statistical Quality control:** - Under this method a sample of items to be controlled is selected and statistically checked to ensure that the established standards of quality are maintained. It involves making things right rather than discovering and rejecting those made wrong. Control charts and acceptance sampling are used for this purpose.

A quality control chart is a graph on which the characteristics of samples are plotted while acceptance sampling is a method in which a sample of products is checked. Full lot is rejected if the percentage of defective items is more than the predetermined limit otherwise the whole lot is accepted. The percentage of defective items that is acceptable is called Acceptable Quality Level (AQL). This level involves a risk (called producer's risk) that an unsatisfactory lot might be accepted.

In the final analysis, excellent businesses know the difference between control and controls. Control is the overall objective or goal management is striving to reach, whereas controls are the devices, tools, procedures, and policies used to reach the goal. Excellent managers are in control because they have set up a system to integrate sanitation, quality, and cost controls.

The Relation to Quality Assurance

Quality control and quality assurance have much in common. Each evaluates performance. Each compares performance to goals. Each act on the difference. However, they also differ from each other. Quality control has as its primary purpose to maintain control. Performance is evaluated during operations, and is compared to goals during operations. The resulting information is received and used by the operating forces.

Quality assurance's main purpose is to verify that control is being maintained. Performance is evaluated after operations, and the resulting information is provided to both the operating forces and others who have a need to know. Others may include plant, functional, or senior management, corporate staffs, regulatory bodies, customers, and the general public, (Slogan, 2004).

2.7 Quality Cost

The term “Quality costs” has different meanings to different people. Some equate “quality costs” with the costs of poor quality (mainly the costs of finding and corrective defective work). Others equate the term with the cost to attain quality; still others use the term to mean the costs of running the quality departments. ‘’Quality cost’’ was first proposed by quality management expert Juran and even after forty years of history and development, there still is not a universal agreed definition by all experts. Juran (1951) as cited by Besterfield, (2004) defined quality cost as expanses enterprise must pay to satisfy customers’ quality needs, which can be divided to ‘’unavoidable cost’’ and ‘’avoidable cost’’. Avoidable cost’’ is emphasized as gold mine because if enterprise can avoid more similar cost, they can be more prosperous, as if they are digging gold. Therefore, defective products resulting in higher total cost is equivalent to the total cost that all enterprises can be save when no defective products have ever occurred.

Feigenbaum (1996) as also cited by Besterfield, (2004) from the point of view of producers defined quality cost as all costs incurred in order to achieve and maintain a certain quality and the costs incurred as a result of specific quality standards is not meet. He was the first to characterize quality cost as the cost of prevention, appraisal, and internal and external failure. Besterfield, (2004) gave Feigenbaum’s definition a much deeper interpretation as cost due to possible or occurred defection.

In order words, because defective quality may happen, therefore there are prevention cost and appraisal cost; if defective quality had already happened, there are internal and external failure costs. The four costs are further defined as follows:

Prevention cost: the cost to prevent defective quality products.

1. Appraisal cost: the cost to prevent defective products passing a specific point or delivering to consumers.
2. Internal failure cost: the cost associated with materials or products that do not meet the standard specifics or are discovered before being delivered to customers.
3. External failure cost: the cost associated with materials or products that are returned due to unsatisfactory quality.

We identify and measure the costs associated with poor quality for three reasons: To quantify the size of the quality problem, to help justify and improvement effort, to guide the development of that effort and to track progress in improvement activities.

Scope of quality costs

Traditionally, the measurement of the quality cost focuses on the cost of nonconformities i.e., defects in the goods and services delivered to external and internal customers. These are often called external and internal customers. These are often called external and internal failure costs.

An important cost that is not measured is lost sales due to poor quality (that is called a "hidden cost" because it is not easily measured). Another omitted cost is the extra cost in processes that are inefficient. These inefficiencies are due to excess product or process variability (even though within specification limits) or inefficiencies due to redundant or non- value-added process steps, (Besterfield, 2004).

Categories of Quality Costs

Figure: 2.5: Categories of Quality Costs Adapted from (Besterfield, 2004)

2. 7.1 Types of Quality

Types of quality are Quality of design, Quality of conformance, Quality of performance as shown in Figure 2.6 below:

1. Quality of Design is the level of quality which the designer intended the product to have expressed in terms of maximum amounts of tolerable variation which may exist in the product.
2. Quality of Conformance is the extent to which the process or factory (industry) faithfully comply with designers' specifications.
3. Quality of performance is the ability of the product to perform its technical function in a satisfactory manner at an economically acceptable cost.

2.7.2 Food and Beverage Quality and Hygiene in Nigeria

As the concern for food safety increases among consumers today, the food service industry inevitably has to strive to meet the required food hygiene quality. Ungku, (2007). Terrorists use food contamination to carry out their attacks, rival firms use this same food

contamination to destroy their competing organizations, fraudulent food producers use substandard or even hazardous substances just to increase their profit; all these and many more does not consider who is at the other end to consume the poison they send into the market. That is why corporate bodies has to ensure the safety and quality of their food products not only for their company reputation, competitive advantage and profiteering but also as contributors to human life sustainability since the consumer who is willing to use your product is committing his/her life in your hands based on trust and this trust which ought not be betrayed is the motivation for this research.

Food quality according to Wikipedia®, (2013), is the quality characteristics of food that is acceptable to consumers. This includes external factors as appearance (size, shape, colour, gloss, and consistency), texture, and flavor.

Food quality is enforced by regulatory bodies such as NAFDAC in Nigeria for purposes like public safety, epidemic control, economic purposes, ecological protection etc.(Lelieveld *et al.* 2005) described it as food hygiene which they defined as the conditions and practices that preserve the quality of food to prevent contamination and food-borne illnesses, it includes all measures necessary to ensure the safety and wholesomeness of foodstuffs. Furthermore, it encompasses all measures and conditions necessary to control hazards and ensure fitness for human consumption of a foodstuff, taking into account its intended use.

As continued in the Wikipedia®, (2013), article on Food quality states that Food Quality is important food manufacturing requirement, because food consumers are susceptible to any form of contamination that may occur during the manufacturing process. Many consumers also rely on manufacturing and processing standards, particularly to know what ingredients

are present, due to dietary, nutritional requirements (vegetarian), or medical conditions (e.g., diabetes, or allergies). Besides ingredient quality, there are also sanitation requirements. It is important to ensure that the food processing environment is as clean as possible in order to produce the safest possible food for the consumer. Food quality also deals with product traceability, e.g. of ingredient and packaging suppliers, should a recall of the product be required. It also deals with labeling issues to ensure there is correct ingredient and nutritional information.

Food processing includes the methods and techniques used to transform raw additives into food for human consumption. Those components of quality depend upon the composition of the food, processing methods, packaging and storage, Adeboye and Babajide (2007). Quality of a food and beverage product involves maintenance or improvement of the key attributes of a product as shown in the Figure 2.7.:

Quality means best for certain customer conditions. These conditions are:

(a) The actual use

(b) The selling price of the product.

Figure 2.6: Attributes of quality food/beverages (Adeboye & Babajide, 2007).

Food processing takes clean, harvested or slaughtered and butchered components and uses them to produce marketable food products. There are several different ways in which food can be produced:

i) **One Off Production** This method is used when customers make an order for something to be made to their own specifications, for example a wedding cake. The making of One Off- Products could take days depending on how intricate the design is and also the ability of the chef involved.

ii) **Batch Production** This method is used when the size of the market for a product is not clear, and where there is a range within a product line. A certain number of the same goods will be produced to make up a batch or run, for example at Bakeries, bakers will bake a certain number of breads. This method involves estimating the number of customers that will want to buy that product.

iii) **Mass production** This method is used when there is a mass market for a large number of identical products, for example chocolate bars, ready meals and canned food. The product passes from one stage of production to another along a production line.

iv) **Just In Time:** This method of production is mainly used in sandwich bars and fast-food restaurants. All the components of the product are available in-house and the customer chooses what they want in their product. It is then prepared with fresh additives in front of the buyer.

Just In Time is a repetitive production system in which processing and movement of materials and goods occur just as they are needed, usually in small batches. Companies that improve performance on a regular and continuous basis certainly will gain the competitive edge. Companies seek competitive advantage by emphasizing on performance factors such as flexibility, cost, efficiency, quality and reliability, quick responsiveness and services. Just In Time manufacturing is a philosophy rather than a technique. By eliminating all waste and seeking continuous improvement, it aims at creating a manufacturing system whose goal is to optimize processes and procedures by continuous pursuing waste reduction. JIT is viewed as a ‘production methodology which aim is to improve overall

productivity through elimination of waste which leads to improved quality (Ubani, 2013).

2.8 Recent developments in the Nigerian food and beverage industry

Just as the issue of consumer protection has gained prominence all over the world especially since the outbreak of the global financial crisis; in which depositors lost billions of dollars globally; the issue has also called for concern in Nigeria.

From the production process to the marketing and distribution of goods produced by unethical business practices, the industry is now known for cutting corners to maximize profit with regulatory bodies making effort to check the trend. Unsuspecting consumers are at the mercy of those who engage in the sharp practices. To the consumer, the seal of the National Agency for Food Administration and Control (NAFDAC) registration number and the Standards Organization of Nigeria (SON) is a mark of quality. However, the reality is different as the consumers are shortchanged by some of the manufacturers in this vital sector of the economy.

Findings by Sloan (2004) reveal that most manufacturers have devised dubious means of cutting cost which has raised serious questions about business ethics and consumers' protection. Indeed, most of these firms compromise quality and safety just to make profit by relegating consumer protection to the background. Most food labels make claims that are at variance to the true contents of their products thereby endangering the lives of consumers.

Some companies not only advertise net-weights that are far higher than what is packaged, but also additives such as excitoxins, Aspartame, Gluten, BHA and BHT's which have been declared illegal by global regulatory bodies. For example, a fruit juice was discovered to have been faked by unknown manufacturer, calling into question how serious quality control is taken in the sector, (Adams, 1990).

Poor product packaging is rampant just as faking of products is also on the rise. Though experts blame the unethical practices on the inexperienced manufacturers and criminals, it is wrong for quacks to toy with the health of consumers.

Sloan (2004) continued in his findings that some products have trademarks and directions for use in languages other than English (the official language) which goes against international convention. His findings show that as the demand for goods remains sluggish and cost increase with pressure from shareholders, there is the likelihood that more firms will engage in unwholesome practices to stay profitable except regulation is strictly enforced. There have been growing calls for stricter regulation to check the excesses of quack manufacturers. Despite unscrupulous practices in the industry, some companies have resisted the urge to engage in unethical practices. These companies are committed to their vision; which is to provide quality, safe and affordable products to the populace.

This is done to; ensure the highest quality and safety of products, protect brand image and market share, reduce materials and additives costs, limit liability of food-borne illness events, reduce product waste and downtime, reduce costs of regulatory compliance and ensure integrity of quality documents.

2.8.2 The Importance of Food Quality and Safety

"We are what we eat" is an old proverb. Our nutritional status, health, physical and mental faculties depend on the food we eat and how we eat it. Safety of food is a basic requirement of food quality. Besides safety, quality attributes include: nutritional value; organoleptic properties such as appearance, colour, texture, taste; and functional properties. "Food safety" implies absence or acceptable and safe levels of contaminants, adulterants, naturally occurring toxins or any other substance that may make food injurious to health on an acute or chronic basis.

Food systems in developing countries are not always as well organized and developed as in the industrialized world. Moreover, problems of growing population, urbanization, lack of resources to deal with pre- and post- harvest losses in food, and problems of environmental and food hygiene mean that food systems in developing countries continue to be stressed, adversely affecting quality and safety of food supplies. People in developing countries are therefore exposed to a wide range of potential food quality and safety risks.

Rapid urbanization has led urban services to be stretched beyond their limits, resulting in inadequate supplies of potable water, sewage disposal and other necessary services. This scenario further stresses food distribution systems as greatly increased quantities of food must be transported from rural to urban locations in an environment that is not conducive to hygiene and sanitation. The issue of street foods merits special attention.

It is often said that the poor will consume "anything" to mitigate their hunger. This may or may not be true. To the extent that this phenomenon exists, it only indicates the trade-off which people may face in difficult situations due to the influence of quality on cost (price). On the other hand, consumption of food which does not meet minimum safety standards can also jeopardize survival. Governments must take the necessary steps through national food security policies, systems and Programmes to ensure that food quality and safety considerations form an integral part of their food security system.

The essence of all national food laws in industrialized and developing countries alike, is based on the following basic provision, which may be worded differently but has similar intent: "Any person who sells to the prejudice of the purchaser any food which is not of the nature or is not of the substance, or is not of the quality of the food demanded by the purchaser, shall be guilty of an offence" Such legislation establishes the will of the governments to protect their populations from unsafe and adulterated foods.

In all countries the food industry bears the responsibility of meeting food quality and safety regulatory requirements. Food preservation, processing and packaging systems can be minimal or highly sophisticated, but assuring food quality and safety in all situations should be a constant.

The industry must play its role in assuring food quality and safety through the application of quality assurance and risk-based food safety systems utilizing current scientific knowledge. The implementation of such controls through national food control systems,

governments should provide a supporting infrastructure and assume an advisory and regulatory role.

Scientific developments have also allowed a better understanding of the nutritional qualities of foods and their health implications. This has led consumers to become more discriminating in food matters and to demand protection from inferior quality and unsafe foods.

Consumers expect that domestic and imported foods will meet basic quality and safety standards and requirements related to food hygiene, labeling and certification, use of food additives, limits for pesticide residues etc.

Access by developing countries to food export markets in general, and of the industrialized world in particular, will depend on their capacity to meet the regulatory requirements of importing countries. For most developing countries, agriculture lies at the Centre of their economies and food exports are a major source of foreign exchange and income generation for rural and urban workers in agriculture and agro-industrial sectors. The long-term solution for developing countries to sustain a demand for their products in world markets lies in building up the trust and confidence of importers in the quality and safety of their food supply systems.

Food supply systems in developing countries are often fragmented involving a multitude of middlemen. This exposes it to various types of fraudulent practices. These may include simple adulteration of food with something of lesser value or no value at all, or mislabeling the product with the intent of misleading the consumer. Besides the public health impact

due to the reduction in the nutrient content of food or food contamination, the consumer is defrauded.

Food is a good indicator of the state of the environment in which it is produced. Monitoring of environmental hygiene against contaminants in food therefore not only assists in ensuring food safety but can also give early warnings about the state of the environment, such as level of heavy metal contamination to enable appropriate action for maintaining its productivity.

2.8.3 Consumers Food Needs

The needs that customer might be seeking to satisfy are:

Figure 2.7: Consumer Food 78Needs Adapted from: (Besterfield, 2004).

These various needs shown in Figure 1.1above play a major role in deciding the factors responsible for defining the different types of quality the final product will possess before handed to the end user, thus, decides the quality management system of the industry concerned. This can be seen in the Coca-Cola vision statement. (Source: Coca-Cola Company, 2013).

Our vision: (the “6 Ps” in Coca-Cola)

- **People:** Be a great place to work where people are inspired to be the best they can be.
- **Portfolio:** Bring to the world a portfolio of quality beverage brands that anticipate and satisfy people's desires and needs.
- **Partners:** Nurture a winning network of customers and suppliers, together we create mutual, enduring value.
- **Planet:** Be a responsible citizen that makes a difference by helping build and support sustainable communities.
- **Profit:** Maximize long-term return to shareholders while being mindful of our overall responsibilities.
- **Productivity:** Be a highly effective, lean and fast-moving organization.

Hence, this study targets at identifying critical success factors in implementing total quality management (TQM) in manufacturing food and beverage industry in Nigerian with Cocacola Bottling Company Ltd a member of Coca-Cola Hellenic group as a case study.

2.8.4 Factors Affecting Quality Management in Food and Beverages Industry

Several factors have been identified to control the quality management processes in the food and beverage industry. Many of them are distinct while some overlapping factors are grouped together to minimize duplication of ideas. However, in this research, the factors captured are but not limited to:

1) Quality of Raw Materials/Additives

2) Top Management Policy and Support `
3) Process Planning and Design
4) Regulatory Bodies
5) Environmental Hygiene and Safety
6) Information Technology
7) Product Mix
8) Storage and Packaging
9) Customer Needs and Expectations.
10) Technological Opportunities
11) Intensity of Competition.
12) Socio-Economic and Political Factors

However, in this study we shall suffice our scope to five impact variables of interest in order to enhance model of performance as previous researches have consistently determined that these factors are mostly important in the regression analysis. However, factor analysis could have been adopted and Best subset method used to arrive at these factors as most repetitive and common amongst the variables.

2.8.5 Factors Affecting Quality Management in Food and Beverage Industry

Several factors control the quality management processes in the food and beverage industry. Many of them are distinct while some interchangeable factors are grouped together to minimize duplication of ideas. However, in this research, the factors captured are but not limited to: quality of raw materials and additives, top management policy and support, Process planning and design, regulatory bodies, environmental hygiene and safety, product mix, Industry maturity, Storage and packaging, Customer needs and expectations.

Technological opportunities, Intensity of competition, Socio-economic and political factors etc. For the purpose of this research, the first five is subjected to evaluation and is discussed in detail below:

2.8.6 Quality of Raw Materials and Additives

As the United Nations Industrial Development Organization, (2006), put it: "No one can make a good product from unsatisfactory raw materials, so every material must have a precise written buying specification so that the purchasing department can buy exactly what is required. Often purchasers are expected to buy from suppliers who have been assessed and approved by them and when supplies arrive, the goods should be checked before acceptance into store. Quality requirements and manufacturing processes should be discussed with the suppliers, as well as the inspection activities to be carried out by the purchaser on the goods on arrival"

It is an established fact that input (raw) materials go a long way to condition the output materials (products). The information technology slogan "garbage in, garbage out" applies extensively here in that the quality state of the input materials forms the bedrock on which additives synthesize to produce the final food and beverage products. In essence, adequate care must be taken to ensure that these input materials must be of high quality if high quality products are desired.

The quality of raw materials is crucial to ensure the safety and quality of the final product. Therefore, a systematic approach is needed to monitor these input materials from plantation

to plate in order to avoid contamination of food and beverage raw materials as well as to track the routes of potential hazards.

The “cradle to grave” philosophy insists that such important products be monitored against contamination from their source to their final consumer. Where the cradle is the agricultural farms, while the grave symbolizes the consumer’s plate. Every stakeholder in the food chain starting from the farmer to the transporter, industrial workers, machine interactions, distributors etc make up the stakeholders in this quality management system in the food and beverage industry.

For centuries, Additives have served useful functions in a variety of foods. Our ancestors used salt to preserve meats and fish, added herbs and spices to improve the flavor of foods, preserved fruit with sugar, and pickled cucumbers in a vinegar solution. In fact, every food we eat - whether a just-picked strawberry or a homemade cookie - is made up of chemical compounds that determine flavor, color, texture and nutrient value. Today, consumers demand and enjoy a food supply that is flavorful, nutritious, safe, convenient, colorful and affordable. Food additives and advances in technology help make that possible.

According to Adeboye and Babajide, (2007), the term Additives refers to "any substance the intended use of which results or may reasonably be expected to result (directly or indirectly) in it becoming a component or otherwise affecting the characteristics of any food or beverage." Additives perform a variety of useful functions in foods that consumers often take for granted. Some additives could be eliminated if we were willing to grow our

own food, harvest and grind it, spend many hours cooking and canning, or accept increased risks of food spoilage.

However, most consumers today rely on the many technological, aesthetic and convenient benefits that additives provide without considering the quality reduction effect of these additives. However, additives are like fire, when harnessed well can be useful but when mishandled can raze down cities. Thus, additives usefulness or dangers depends on the composition, quantity added and the way they are added.

2.8.7 Top Management Policy and Support

Top Management means the executive arm of a corporate organization who has administrative control over the company. They exercise both legislative and executive powers who bears the pains and profits realized from the business. Thus, they have to enact strategic plans that best suits the business as well as communicate and enforce these policies. According to ISO 9001 series, (2012), "Leaders establish unity of purpose and direction of the organization. They should create and maintain the internal environment in which people can become fully involved in achieving the organization's objectives." The effect of Top Management Support and Policy on food and beverage quality is portrayed through: Managerial commitment, Quality objectives and policy design Quality Management System planning, Internal communication, Responsibility and authority, Customer focus, Provision of resources, Competence, awareness and training, establishing the quality policy and strategies, applying quality risk management, ensuring that quality objectives are established through adequate enforcement, communicating to the organization the importance of meeting customer as well as regulatory and legal

requirements, including environmental, health and safety aspects, ensuring the availability of resources, particularly quality conscious manpower, suitably trained, conducting management reviews and other managerial undertakings.

2.8.8 Process Planning and Design

As stated by the United Nations Industrial Development Organization, (2006), The specifications and drawings produced by the designer should show the quality standard demanded by the customer or marketplace in clear and precise terms.

According to ISO 9001 series, (2012), “A desired result is achieved more efficiently when activities and related resources are managed as a process.”

Hence, food processing techniques should have enormous effects on the quality and nutritional value of processed foods. The amount of nutrient loss caused by food processing techniques has encouraged some health-conscious consumers to eat more raw foods. In general, this is a positive step. However, these food processing techniques are also beneficial, because it kills potentially harmful microorganisms that are present in the food supply. In particular, poultry and ground meats (e.g. hamburger) should always be thoroughly cooked, and the surface of all fruits and vegetables should be carefully washed before eating.

Nearly every food preparation process reduces the amount of nutrients in food. In particular, processes that expose foods to high levels of heat, light, and/or oxygen cause the greatest nutrient loss. (Andaleeb & Caskey, 2007). Nutrients can also be "washed out" of foods by fluids that are introduced during processing. For example, boiling a potato can

cause much of the potato's B and C vitamins to migrate to the boiling water. You'll still benefit from those nutrients if you consume the liquid (i.e. if the potato and water are being turned into potato soup), but not if you throw away the liquid. Similar losses also occur when you boil, roast, or fry in oil, and then drain off the drippings. The table above compares the typical maximum nutrient losses for common food processing methods. By this information, we see that the need to design a food processing plan is not a mere necessity both to the producer and consumer’s interest.

Table 2.1: Nutrient Losses for Common Food Processing Methods

Typical Maximum Nutrient Losses (As Compared To Raw Food					
Vitamins	**Freeze**	**Dry**	**Cook**	**(Cook+Drain**	**Reheat**
Vitamin A	5%	50%	25%	35%	10%
Retinol Activity Equivalent	5%	50%	25%	35%	10%
Alpha Carotene	5%	50%	25%	35%	10%
Beta Carotene	5%	50%	25%	35%	10%
Beta Cryptoxanthin	5%	50%	25%	35%	10%
Lycopene	5%	50%	25%	35%	10%
Lutein+Zeaxanthin	5%	50%	25%	35%	10%
Vitamin C	30%	80%	50%	75%	50%
Thiamin	5%	30%	55%	70%	40%
Riboflavin	0%	10%	25%	45%	5%
Niacin	0%	10%	40%	55%	5%
Vitamin B6	0%	10%	50%	65%	45%
Folate	5%	50%	70%	75%	30%
Food Folate	5%	50%	70%	75%	30%
Folic Acid	5%	50%	70%	75%	30%
Vitamin B12	0%	0%	45%	50%	45%
Minerals					
Calcium	5%	0%	20%	25%	0%
Iron	0%	0%	35%	40%	0%
Magnesium	0%	0%	25%	40%	0%
Phosphorus	0%	0%	25%	35%	0%
Potassium	10%	0%	30%	70%	0%
Sodium	0%	0%	25%	55%	0%
Zinc	0%	0%	25%	25%	0%
Copper	10%	0%	40%	45%	0%

Source: (Adapted from: Andaleeb and Caskey, 2007)

2.8.9 Regulatory Bodies

Industrial quality regulations are those official standards or order with force of law issued by government food enforcement agency stating what should or should not be done or how quality standards must be done in other to control the excesses of the food and beverage industrial activities. These regulations officially approve the standards guidelines to be

adhered and conformed to in the industry. Industrial Regulations has become a major element of the environment in which firms operate that constrains their strategic quality behavior. The food industry is a typical example of this through the National Food and Drug Administration Commission (NAFDAC). Firms that adapt quickly by compliance to new more stringent regulations usually gain an advantage in the market place. Firms choose to comply voluntarily to regulation if it is triggered by "market-based incentives" such as expected economic benefits. However, in many cases, compliance with regulation depends on the strength of the enforcement authorities, i.e. "regulatory incentives".

2.8.10 Environmental Hygiene and Safety

Environmental Hygiene refers to Environmental cleanliness and preservation of health. Safety is a condition free from hazards (things that have the potential to cause harm).By Environmental Hygiene and Safety, we mean the science dealing with the preservation of health through the practice of cleanliness to isolate hazardous substances and incidents in the immediate ecological habitat under study, Adams, (1990). Environmental disruptions that have direct impact on human health include: soil acidification, over-fertilization, climate change, pollution, dispersion of dangerous industrial wastes such as radioactive substances etc. Aspects of environmental quality and life style that are not voluntarily chosen (e.g. passive smoking, noise nuisance, stress) are also disruptive.

A basic principle of environmental policy must be to limit the negative influence of these disruptions on human health through food intake to non-harmful levels. In an unhygienic and unsafe environment, the quality of food processing, storage, handling, distribution and consumption are highly neglected. The food merchants take advantage of this negligence to produce substandard products and no one takes nor is held responsible of epidemic effect

of this social crimes. This accounts for the wide spread of diseases through circulation of poor quality and disease infected food and beverages.

2.8.11 Product Mix

Han and Ryu, (2009) defined Product Mix as the number of products the firm in question produces at a given period of time. Firms engage in a product mix for diversification and for optimal or efficient use of their resources. For example, firms will like to produce products that share the same raw materials, production line, markets etc together than producing them in isolation which makes them incur extra processing and overhead costs. Some products must be produced at high quality especially products in direct contact with human health. If such products are to be produced alongside with others that maybe a less or variable quality, then, care has to be taken in other not to compromise both cost and quality. In so doing,; product compatibility, production feasibility, cost, quality and other factors are considered in this product mix engineering to avoid food poisoning, contamination and accidents that can push the company under the drain should the consumers be adversely affected. However, legal and government regulations are a major factor in deciding the variety of products to be mixed.

2.8.12 Industry Maturity

One of the main ideas in theories of industrial evolution is that competitive innovations becomes more stringent as a business mature. As a market matures and customer needs become defined in a better way, companies transfer the focus of their competition to expenses that will make their processes more effective and more efficient so as to keep attracting more customers and keep retaining the loyalty of existing customers. This

sophistication forces such companies to implement competitive quality management systems.

2.8.13 Storage and Packaging

With few exceptions, nutrient levels and/or their bioavailability are reduced in foods after harvest, during processing, transportation, distribution etc. the most influential is during storage. Food storage is an important component of food preservation, Adeboye and Babajide (2007). Rate of these losses is usually attenuated by reducing temperature of storage. Initial heat processing to the point of enzyme inactivation, or to the point of microbial sterilization, "stabilizes" the food so that it does not "spoil" but at the same time causes a greater initial reduction in certain nutrients, and a more gradual reduction with extended storage. These anticipated changes in nutritive value are of particular significance in nutrient labeling, and must be taken into account when preparing nutrient labels as a mark of the quality level of the products. Many reactions that may deteriorate the quality of a food product occur during storage. The nutrient content of foods may be adversely affected by improper storage. For example, a significant amount of vitamin C and thiamine may be lost from foods during storage. Other undesirable quality changes that may occur during storage include changes in colour, development of off-flavours, and loss of texture.

A properly designed food storage system allows fresh or processed foods to be stored for extended duration while maintaining quality. The most important storage parameter is temperature. Most foods benefit from storage at a constant, low temperature where the rates of most reactions decrease and quality losses are minimized. In addition, foods containing high concentrations of water must be stored in high-humidity environments in order to

prevent the excessive loss of moisture. Careful control of atmospheric gases, such as oxygen, carbon-dioxide, and ethylene, is important in extending the storage life of many products.

On the other hand, since packaging helps to control the immediate environment of a food product, it is useful in creating conditions that extend the storage life of a food. Plastic materials are widely used in food packaging because they are relatively cheap, lightweight, and easy to form into desired shapes. However, their selective permeability to gases, such as carbon-dioxide and oxygen, as well as light and moisture, has led to the development of hazardous contaminants which impairs the quality of the product being protected.

However, from quality perspective, dehydrated foods must be protected from moisture during storage. Packaging materials such as polyvinyl chloride, poly vinyldene chloride, and polypropylene offer low moisture permeability. Similarly, 4r45tpackaging materials with low gas permeability are used for fatty foods in order to minimize oxidation reactions. Because fresh fruits and vegetables respire, they require packaging materials, such as polyethylene, that have high permeability to gases. Smart packages offer properties that meet the special needs of certain foods. For example, packages made with oxygen-absorbing materials remove oxygen from the inside of the package, thus protecting oxygen-sensitive products from oxidation. Temperature-sensitive films exhibit an abrupt change in gas permeability when they are subjected to a temperature above or below a set constant. These films change from a crystalline structure to an amorphous structure at a set temperature, causing the gas permeability to change substantially. Since packaging is a storage processes as well as physical attraction, the materials chosen for this purpose must

be carefully selected in order not to jeopardize the intended quality levels of the product since most of the storage and packaging materials are very reactive.

Others factors includes:

2.8.14 Customer Needs and Expectations

According to the ISO 9001 series, (2012), "Organizations depend on their customers and therefore should understand current and future customer needs, should meet customer requirements and strive to exceed customer expectations." The food and beverage industry ranks high in respecting the optimum satisfaction of customer expectations. As a customer-oriented industry, prompt response to sudden changes to customer orders, call for innovative efforts in design and maintenance of a good corporate quality management function in order to remain completely market oriented. Thus, quality management processes are responsive socio-economic stimuli for exponential increase of the selling potential and demand elasticity of their products which hijacks the market opportunities to their favor.

2.8.15 Technological Opportunities

Entrepreneurs are led by technological advantages. Strong technical base concentrates dynamic innovational activities in the most productive direction which in turn will offer them both the leading edge in the industry as well as shock absorption strength when customer needs suddenly fluctuates.

However, as product quality is a driving force for product acceptability in the market, technical advantage offers an added advantage in meet customer satisfaction as it drives high yield and specification conscious production processes. In this modern, technology-dependent world, it is imperative to get a quality food. While economic and social factors are often solely blamed for poor quality foods, there are many factors that affect legislations on the production of high-quality food products. Through taxes, political promises for special interest groups and efforts to encourage industrial competition, millions of

consumers are affected by food manufacturing policies that are not always created with their best interests in mind.

2.8.16 Intensity of Competition

It is an established fact that market concentration is a stimulus to continuous improvement since a more competitive environment would give a greater incentive to the participating firms to sleep with one eye open in terms of the vigilance in continuous quality improvement. Companies in less competitive or monopolistic markets has little or nothing to protect since the customer has no choice to reject what they are served. Contrarily, stringent competitive markets always showcase quality products of varying sophistication. Thus, a firm in such cases always builds strong quality management processes as a first line of defense against rival firms.

2.8.17 Socio-Economic and Political Factors

Socio-political economics is the study of the relationship between a political society and economic phenomena. The discipline draws on theories and research methods from sociology, economics and other social sciences. As lifestyle measurements, they are believed to be directly correlated to patterns of food manufacturing, choices and consumption, disease prevalence and rates of mortality in human populations. These factors may impact a person's food demand schedule. As countries seek to provide quality food and beverages so as to reduce health related challenges, it is increasingly evident that political, economic, and social factors outside the production plants play an important role in the food manufacturing processes. Governance, is notably political stability and absence of violence, is an important contributor to a nation’s socio-economic advancements. Specifically, the greater a nation’s political stability and absence of violence the greater the

socio-economic stability and the more these Socio-political economic factors yield positively to food and beverage quality management. Some of the Socio-political economic factors considered here includes: public policies, health status, net income, environment, education, Culture, religion, globalization, technological advancement, public funding and local politics are the main elements that are explored as Socio-political economic factors affecting the food and beverage industry. Among these factors, research has shown that psychological factors are the most dominant since people who live in deprived areas generally do so because they are poor. Studies show that poorer citizens tend to engage in physically stressful, low-paid work that is often more dangerous than that done by their richer counterparts. They also tend to live in more polluted environments. Housing in these areas is often cramped and in poor quality, which also impacts an individual's health. Poorer citizens may also have to rely on state healthcare or the cheapest options in paid healthcare, which could deny them access to the best treatments. These poor choices does not spare their desire for quality foods and beverages as consumers neither do, they have the enlightenment to produce quality products as producers.

2.8.18 Trend and Challenge Issues in the Food and Beverage Industry

As Garvin and Artemis (1981) stated, defective food and beverage product not only contributes to the final cost of the product but also to the cost of rework, recycle or marketing which can be substantial. One major source of the problems in quality management is the human factor. The design, implementation and feedback mechanism in quality management techniques are all carried out by humans and in turn inherit the human errors associated with it. The most common aspect prone to quality management techniques failures is in the implementation, (Besterfield, 2004). In his survey, he further pointed out

that, “When you try to implement a methodology or invite a habit in your organization it won’t ever go without any problems. People don’t like to change, though their adaptation skills are high.” Garvin and Artemis (1981) emphasized that one of the hardest things to implement in a production site is control and subsequently, change management since people don’t want to be monitored and controlled as they see it as you are manipulating them. In line with this argument, (Besterfield, 2004) concluded if we can first monitor and control people, we will go a long way to control the activities but since people are resistant to monitoring, controlling and change implementation, then, quality control techniques cannot meet their anticipated goals and efficiencies.

However, majority of the surveys on the problems and challenges associated with food quality management techniques reveals that these problems and challenges are unlimited, though they vary from organization to organization, yet most of them are inherent in all business ventures or at least appear as the same person in different apparel.

These challenges include but are not limited to those listed by Aksu, (2006), as: Lack of inspection, Insufficient site supervision, Making use of inexperienced, unqualified inspectors, Unqualified labor force, Avoiding and ignoring inspection completely, Non implementation of corrective actions during the process, Inaccurate measurement, Conflicting policies, Lack of communication, Non-compliance with specifications, Defects resulting from the wrong selection of materials, Using materials unsuitable for the climatic conditions, Making use of cheap materials or expired materials, Inadequate storage facilities, Misuse of equipment, Equipment not performing to specification, Lack of the

proper equipment etc. In addition to this detailed survey by Aksu, (2006), the following problems also apply:

- The management system: Many organizations' food quality management systems are faulty right from their design. According to Garvin and Artemis (1981)," If the plan is faulty, then, it will always fail."
- Worker's attitude: this category of food quality management problems ranges from corporate rebellion, non-challant attitude, "short-cut syndrome" etc that hinder smooth food quality management measures.
- Lack of management support: The problem of lack of management support in which food quality management is seen as a business of the shop floor and not for the organization as a corporate entity. Otherwise, should be properly integrated into the standard organizational processes.

Others include: Team members are not familiar with the process, poorly defined roles allocation and responsibilities, key decisions made without considering alternatives and reactions, running a reactive management instead of proactive management, lack of team spirit at the shop floor, poor resource allocation and adequate utilization, lack of enforcement etc.

In addition, inconsistencies in food quality management techniques used, lack of upgrading, modernization and introduction of new methods regularly, lack of technical innovations, trainings and development of workers are also key challenges in the food quality management systems.

Irrespective of these challenges, (Besterfield, 2004), advised that, for adequate inspection to be in place to highlight deviations when they just occurred without further delays.

(Besterfield, 2004), further expatiated the need for proper monitoring and control through inspection when he commented that "Conditions under which food quality management takes place are often far from ideal with the focus mainly being on speedy delivery. Defects resulting from food quality management can be avoided by ensuring that proper inspection mechanisms are in place."

Hence, to adequately ensure consumer protection, customer satisfaction, total compliance to local and international food regulatory requirements while retaining market share profitably and in a sustainable environment, there is need to evaluate these factors that influence the food quality management system as highlighted in the previous section. In addition to implementing these managerial policies enshrined in the corporate food quality management system, it is also important that they should be properly integrated into the standard organizational processes and properly monitored and controlled which is the objective aim of this research.

2.9 Review Summary

Total quality management implementation is undoubtedly inevitable for improved management process in all industrial set up. However, the adoption of total quality management in project management is somewhat indispensable as it is a necessary tool in management decision in every aspect of manufacturing including food and beverage industries. The need to further improve production, output elucidates the avowed importance of total quality management implementation especially in project management activities from conceptualization to end of project activities.

In engineering activities, managements and sciences the implementation of total quality management is wholly indispensable as it is a means and method to improve processes and increase output and performance. In this work, we have done enough justice in outlining the vivid importance of the implementation of total quality management (TQM) and how we could achieve its optimal utilization.

2.10 Research Gap:

The research gap highlighted before that over the years we have had inadequate research materials with studies in developing economies of which Nigeria is included, We have been able to fill this gap where studies can begin to access indigenous research work.

CHAPTER THREE

METHODOLOGY

3.1 Research Design

Cross–sectional studies design will be used for this study. This design involves observation of all element of a population, or a representative subset, at one specific point in time over a period of time. The research is exploitative in nature as it was based on an opinion research of the personnel in direct link with the quality management system of the organization under study and qualitative research methodology is hereby selected using surveys. The qualitative research methodology surveys is adopted which follows a study design and an in-depth analysis of opinion research. It is exploratory and interpretative in nature. The approach to empirical research adopted for this study was one of structured descriptive questionnaire and interview approaches. A detailed regression model is adopted in the course of this methodology having identified the impacting variables of interest and the impacted variables. The following are the variables identified which are listed as follows, they are the response from the questionnaire was used to carry out analysis using multiple regression and correlation. The questionnaire was designed to obtain the perception of employees working in two different location of the Coca-Cola Plants viz a viz Owerri and Port Harcourt Plant and they were asked to indicate there level of agreement to the liker scale of the five success factors so identified already in total quality management(TQM) implementation. The hypotheses were tested using analysis of variance (ANOVA), t-test and f-test.

The hypothesis testing was done using the t-test statistic and p(value) value used to ascertain their level of significance with already conformance value of 5%. The model so designed for the multiple regression analysis is as follows.

$Y= b_0+b_1x_1 +b_2x_2……b_nx_n + e$

The purpose of this research is the identification of the critical success factors in implementation of total quality management in food beverage and manufacturing industry. This is achieved using Coca-Cola Nig. Plc as a case study where we collected total of 73 respondents from two plant locations of the Organization.

The method used is the qualitative research method using survey by a detailed Questionnaire after which feedback was gotten. The educational qualifications, years of experience of individual respondents and level of personnel in management of the organization were added and with it, we were able to rank the importance of the selected factors and the most important factors amongst the listed factors were studied in detail.

Important itemized five factors were discussed with the Supervisor and agreed upon.

The strategy deployed in the research included the questionnaire sent to the Coca-Cola Plants location in Owerri and Port-Harcourt where opinion of workers mostly at the quality assurance department were sampled to know the extent of relevance of these factors to total quality management implementation.

In the questionnaire given, a total of 73 different employees participated in the exercise at the two plant location.

Following are the details of the participants in the questionnaire, 5 numbers in the Top Management, 20 in the middle management and 45 staffs in the senior Management.

In the years of experience, (5-10 years) 6 staffs, (10-15 years),18 staffs, (15-20 years), 39 staffs, 20 years and above we have 10 staffs.

3.2 Study Area

This study is conducted at Coca-Cola bottling company at Port Harcourt plant, Rivers state and Owerri Plant Imo State.

3.2.1 Survey of the Method of Data Collection

There are basically two sources of data as used in this study: primary and secondary data. The sources of primary data for this study included through questionnaire, interview and personal observations.

The secondary data on the other hand, were obtained from published documents and literatures that were relevant to objectives of the research study. These secondary source materials comprised of textbooks, journals, newspapers, unpublished thesis etc. The primary data used for this research was gathered by a combination of interviews and questionnaire administration.

3.3 Validity and Reliability of Questionnaire

The questionnaire was carefully scrutinized by the supervisor and other academic lecturers. It comprises of necessary information that will assist the researcher to achieve a positive result. The factors that are to be analyzed the relevant points that are necessary in the food and beverages industry are included. To the interviewers, the question was well understood and a clear answer was provided to enable the researcher to have a successful project. The questionnaire based on these are reliable and a valid document.

3.4 Design of Questionnaire

The major instrument used for this research survey was the questionnaire. The opinion survey was from members of staff of the companies selected as studies who were in direct work contact with the products under study. The questionnaire was designed in the Likert five (5) point formats to elicit information on issues relating to the objectives of the study. In so doing, Likert scaling assumes that distances on each item are equal. The format of the five-level Likertitem, was:

1. Disagree
2. Strongly disagree
3. Neither agree nor disagree
4. Agree
5. Strongly agree

The scale below was used to interpret the total responses of all the respondents for every survey question by computing the weighted mean:

Table 3.1: Likert Five (5) Point Scale

RANGE	INTERPRETATION
4.00 – 5.00	Strongly Agree
3.00 – 4.00	Agree
2.01 – 3.00	Neither agree nor disagree
1.01 – 2.00	Strongly Disagree
0.00 – 1.00	Disagree

(Adapted from: Han and Ryu, 2009).

Distribution of the Questionnaire

The questionnaires personally administered were retrieved from the respondents within two weeks. The simplicity of the questionaires helped to stimulate the respondent's interest in supplying the requested answers to the questions. The introductory letter to each respondent and a sample of the questionnaire administered through which the research data were collected are attached in Appendix 1 and 2.

3.5 Method of Data Analysis

After gathering all the completed questionnaires from the respondents, total responses for each item was obtained and tabulated. In order to use the Likert-scale for interpretation, weighted mean to represent each question will be computed. The Statistical tool used for the analysis is the ANOVA (Analysis of Variance) and LSD (Least Square Difference) methods. Statistical techniques of multiple regression analysis were also used. The model was specified as follows. $Y= b_0+b_1x_1 +b_2x_2\ldots\ldots\ldots\ldots\ldots b_nx_n + e$ where e=0, and

b1…….bn are parameters referred to as regression coefficients. x_1= quality of raw material and additives, x_2= quality of food and beverage top management policy and support, x_3= quality of food and beverage process planning and design, x_4= quality of food and beverage regulatory bodies, x_5= quality of food and beverage environmental hygiene and safety. Correlation analysis was used to determine the degree of relationship between the dependent and independent variables stated above.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 DATA PRESENTATION

The following data are presented in order to carry out adequate investigation of the report under review.

4.1.1 Factors Analyzed

Quality of food and beverage raw materials and additives (x_1)

Quality of food and beverage top management policy and supports (x_2)

Quality of food and beverage process planning and design, (x_3)

Quality of food and beverage regulatory bodies, (x_4)

Quality of food and beverage environmental hygiene and safety (x_5)

Respondent scores for factor x_1 to x_5.

Table 4.1 Statement and scores for Respondents 1.

	1	2	3	4	5	Total
X_1	5	4	5	3	4	21
X_2	4	4	4	5	3	20
X_3	4	4	4	5	4	21
X_4	4	3	5	4	3	19
X_5	5	5	5	4	4	23

Source: variables factors $x_1 – x_5$

Table 4.1 shows how the respondent scores for 73 respondents were generated. For instance, respondent 1 score 5 for the first statement, 4 for the second statement, 5 for the third statement, 3 for the fourth statement, and 4 for the fifth statement which gave a total score of 21 for factor x_1.

For factor x_2, respondent 1 score 4 for the first statement, 4 for the second statement, 4 for the third statement, 5 for the fourth statement, 3 for the fifth statement which gave a total score of 20.

For factor x_3, respondent 1 score 4 for the first statement, 4 for the second statement, 4 for the third statement, 5 for the fourth statement, 4 for the fifth statement which gave a total score of 21.

For factor x_4, respondent 1 score 4 for the first statement, 3 for the second statement, 5 for the third statement, 4 for the fourth statement, 3 for the fifth statement which gave a total score of 19.

For factor x_5, respondent 1 score 5 for the first statement, 5 for the second statement, 5 for the third statement, 4 for the fourth statement, and 4 for the fifth statement which gave a total score of 23.

Through these ways the 73 respondent scores were generated.

Table 4.2: Respondent score for quality management index in food and beverage industry (Y). Statement and score for Respondent 1.

	Statement/Score										
Respondent 1	1	2	3	4	5	6	7	8	9	10	Total
Y	4	5	4	4	5	3	4	5	4	3	41

Source: Appendix 1

For instance, respondent 1 score 4 for first statement, 5 for second statement, 4 for the third statement, 4 for the fourth statement, 5 for the fifth statement, 3 for sixth statement, 4 for the seventh statement, 5 for the eighth statement, 4 for the ninth statement, 3 for the tenth statement which gave a total score of 41. Through these ways, the 73 respondent scores were generated.

Data for Analysis is shown below in table 4.3.

Table 4.3: Generated Data from the 73 respondents for analysis

Respondent	X_1	X_2	X_3	X_4	X_5	Y
1	21	20	21	19	23	41
2	22	22	21	21	23	37
3	22	22	21	21	23	37
4	22	22	21	21	23	37
5	24	19	21	17	22	41
6	24	19	21	17	22	41
7	24	19	21	17	21	41
8	24	19	21	17	20	35
9	24	19	21	17	22	37
10	23	19	21	20	24	37
11	23	19	21	20	24	37
12	23	19	21	19	24	37
13	23	20	21	18	22	38
14	21	23	19	18	22	38
15	21	23	19	18	22	38
16	21	23	19	18	22	38
17	21	23	19	18	22	38
18	21	23	19	18	22	38
19	21	23	19	18	22	38
20	21	23	19	18	22	38
21	21	23	19	18	22	38
22	21	23	19	18	22	38
23	21	23	20	18	22	38
24	21	23	19	18	22	38
25	21	23	19	18	22	38
26	21	23	20	18	22	38
27	20	23	19	18	22	38
28	21	23	19	18	22	38
29	23	19	21	20	24	37
30	22	22	19	20	23	37
31	22	21	22	21	22	39
32	23	19	21	20	24	36
33	24	20	21	21	22	37
34	24	19	21	17	22	37
35	24	19	21	17	22	37
36	24	19	21	17	22	37
37	24	19	21	17	22	37
38	24	19	21	19	22	35
39	24	19	21	17	22	37
40	24	19	21	21	22	37
41	24	19	21	17	22	37
42	24	19	21	17	22	37
43	23	19	21	20	22	38

Respondent	X_1	X_2	X_3	X_4	X_5	Y
44	23	21	20	17	23	37
45	23	19	21	19	25	32
46	24	19	21	19	25	35
47	22	22	21	21	23	37
48	22	22	21	21	23	37
49	22	22	21	20	23	37
50	22	22	21	21	23	37
51	22	22	21	21	23	37
52	22	22	21	21	23	37
53	22	22	21	21	23	37
54	22	22	21	20	23	37
55	21	20	21	19	23	41
56	21	20	21	19	23	41
57	21	20	21	19	23	41
58	21	20	21	19	23	41
59	21	20	21	19	23	41
60	21	20	21	21	23	43
61	21	20	21	19	23	41
62	21	20	21	19	23	41
63	21	23	19	18	22	38
64	21	22	20	25	23	43
65	21	22	20	25	22	43
66	22	19	21	21	22	39
67	21	22	21	22	23	42
68	21	21	21	23	21	42
69	21	21	21	23	21	41
70	21	22	21	20	22	39
71	22	21	21	23	21	41
72	21	22	19	19	23	37
73	21	22	19	19	23	37

4.2.0 Data Description

4.2.1 Descriptive Analysis from the Multiple Regression Analysis

Table 4.4: Descriptive statistics

	Mean	Std. Deviation	N
Y	38.2603	2.10177	73
X_1	22.0959	1.22661	73
X_2	20.9041	1.60004	73
X_3	20.4658	.88321	73
X_4	19.2877	1.88915	73
X_5	22.4932	8.6800	73

Source: Regression Result in Appendix 2

From the Table 4.4 above, is shown that the average level of quality achieved in the food and beverage industry is 38.2603, this is low and from the basis of this analysis, the mean score of x_1 to x_5 indicates the average contribution of each of these factors to the level of quality management performance in the food and beverage industry.

4.3.0 Data ANALYSIS

4.3.1 Multiple Correlation Analysis of the Five Factors on Quality Management Index (Y).

Table 4.5 shows the correlation analysis between five predetermined factors and dependent factor Y which determines the level of dependency existing among the five independent factors (x) and dependent factor (Y). The indication is that the closer the correlation are to 1, the more the problem of dependency among the variables or multi-co linearity exist and can be used for further analysis x_1, x_2, x_3, x_4, x_5.

Table 4.5 Correlation Analysis for factors x_1 to x_5

Pearson Correlation	**Y**	**X_1**	**X_2**	**X_3**	**X_4**	**X_5**
Y	1.000	-.452	.061	.061	.341	-246
X_1	-.452	1.000	-.760	.535	-.294	-.006
X_2	.061	-.760	1.000	-.725	.156	-.155
X_3	.061	.535	-.725	1.000	.268	.204
X_4	.341	-.294	.157	.268	1.000	.183
X_5	-.246	-.006	-.155	.204	.183	1.000
Sig.(1-tailed)						
Y	.	.000	.303	.304	.002	.018
X1	.000	.	.000	.000	.006	.480
X2	.303	.000		.000	.093	.094
X3	.304	.000	-.000		.011	.042
X4	.002	-.006	.093	.011		.060
X^5	.018	.480	.094	.042	.060	
N						
Y	73	73	73	73	73	73
X1	73	73	73	73	73	73
X2	73	73	73	73	73	73
X3	73	73	73	73	73	73
X4	73	73	73	73	73	73
X5	73	73	73	73	73	73

From the table 4.5 above, the maximum correlation is 0.535 between x_1 and x_3 while the lowest correlation exists between x_5 and x1 (-0,006). The implication is that for the maximum correlation between x_1 and x_3 means that quality of food and beverage raw material and addictives may have been so high that is warrants high level of quality of food and beverage process planning and design in order to guarantee high level of quality management performance in food and beverage industry. The lowest correlation exists x_5 and x_1 implying that x_5 (quality of food and beverage environmental hygiene and safety) may have been so low that it reduces the quality of food and beverage raw material and

addictives which will invariably have negative effect on quality management performance of food and beverage industry.

4.4 Multiple Regression Analysis for Coefficient Correlation (R) and Coefficient of Determination (R^2) for the Five Identified Factors and Quality Management Index (Y).

Table 4.6: Below show the level of R and R^2 between the five variable and quality management index (Y)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.766[a]	.586	.555	1.40170	1.903

Predictor: (Constant), X_5, X_1, X_4, X_3, X_2

Dependent variable: Y

From the above table coefficient correlation (R) value of 0.766 shows that there is a high correlation existing between the variables which is 76.6% level of correlation and coefficient of determination (R^2) value of 0.586 which means that all the variables (x_1,x_2,x_3,x_4,x_5) jointly accounted for 58.6% of the variation in Y (dependent variable). When adjusted R^2 value of 0.555 (55.5%) emerged.

4.5 Multiple Regression Analysis for Unstandardized and Standardize Coefficient

Table 4.7 Multiple Regression Analysis for factors x_1 to x_5

Model	Unstandardized Coefficients		Standardized Coefficients	t	sig.
	B	Std. Error	Beta		
1 (Constant)	109.057	12.294		8.871	0.000
X_1	-1.695	.220	-989	-7.705	0.000
X_2	-.943	0.206	-718	-4.580	0.000
X_3	0.236	0.332	0.099	0.712	0.479
X_4	0.238	0.113	0.214	2.102	0.036
X_5	-1.025	0.199	-423	-5.139	0.000

Dependent variable: Y

Source: regression result in appendix 2

The model that can be derived from the above table is as follows;

$Y=109.057 – 1.695X_1- 0.943X_2 + 0.236X_3+ 0.238X_4 – 1.025X_5$……. equation 4.1

Where;

Y = Quality Management Index of food and beverage industry.

X_1 = Quality of food and beverage raw materials and addictive.

X_2 = Quality of food and beverage top management police and supports.

X_3 = Quality of food and beverage process planning and design.

X_4 = Quality of food and beverage regulatory bodies.

X_5 = Quality of food and beverage environmental hygiene and safety.

The coefficient of the factors indicates the marginal effect of the each identified factors on Y, while other factors are held constant. This implies that the increase or decrease in the dependent variable Y as a result of 1-unit increase or decrease in the factors.

To illustrate, for x_1 = -1.695 implies that for every 1 unit decrease in quality of food and beverage raw material and addictive, quality management index will decrease by 1.695, if other factors are held constant.

For x_2=-0.943 implies that for every 1 unit decrease in quality of food and beverage top management police and support, quality management index will decrease by 0.943, if other factors are held constant.

For x_3=-0.236 implies that for every 1 unit decrease in quality of food and beverage process planning and design, quality management index will increase by 0.236, if other factors are held constant.

For x_4=-0.238 implies that for every 1 unit increase in quality of food and beverage regulatory bodies, quality management index will increase by 0.238, if other factors are held constant.

For x_5=-1.025 implies that for every 1 unit decrease in quality of food and beverage environmental hygiene and safety, quality management index will decrease by 1.025, if other factors are held constant.

From the above model, it can be seen that quality of food and beverage raw materials and addictive's x_1 exerted the highest negative influence on quality management index performance while x_4 quality of food and beverage regulatory bodies shows the lowest positive effect on quality management index (Y).

4.6 Significance of the Inclusion of all Variable in the Model

The ANOVA is used to test the significance of inclusion of all variable in the model generated. In order wise, it try to test the significance of the model in predicting the quality management index in food and beverage industry.

Table 4.8: ANOVA

Model	**Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**
Regression	186.415	5	37.283	18.976	.000[a]
Residual	131.640	67	1.965		
Total	**318.055**	72			

Predictors: (Constant), X_5, X_1, X_4, X_3, X_2

Dependent variable: Y

Source: Regression result in appendix 2

From the above table 4.8, the sum of squares of 186.415 and mean of square is 37.283 with F.cal value of 18.976 is significant at .000 level, implying that at 0.05 level of significant, the model is significant in predicting the level of quality management index in food and beverage industry at any point in time.

4.7 Hypothesis Testing

Table 4.9: Coefficients for Factors X_1 TO X_5

Model	**T**	**Sig.**
(Constant)	8.871	0.000
X_1	-7.705	0.000
X_2	-4.580	0.000
X_3	0.712	0.479
X_4	2.102	0.039
X_5	-5.139	0.000

Dependent variable: Y

Ho_1: The effect of all identified quality management success factors on food and beverage processing are not significant.

H$o_{2:}$ The effect of each of the identified quality management success factors on food and beverage processing is not significant.

The t calculated value of -7.705 is significant at 0.000 level, and this implies that at 0.05 level of significant, x_1 is significant, we reject Ho_1 and accept Ho_2 concluding that the effect of each identified quality management factor of food and beverage processing is not significant. X_2 is significant at 0.000 level which implies that at 0.05 level of significant of t calculated value of -4.580. X_3, t calculated value of 0.712 is not significant at 0.479 level meaning that 0.05 level significance, x_3 is not significant in predicting Y. X_4, t calculated value of 2.102 is significant at 0.039 level meaning that 0.05 level of significant X_5, t calculated value of -5.139 is significant at 0.000 level, meaning that at 0.05 level of significant.

4.8 Priority Ranking of the Identified Factors Based on the Level of Importance.

Table 4.10: The Rank Results for the five factors based on level of important.

Factors	**t value**	**P value**	**Ranking**
X_1	-7.705	0.000	1
X_2	-4.580	0.000	3
X_3	0.712	0.479	5
X_4	2.102	0.039	4
X_5	-5.139	0.000	2

Source: Regression result in appendix 2

4.9 Discussion of Result Finding

From the findings, the results of table 4.10

X_1 (Food and beverage raw materials and additives) rank the first due to it is the initial product that will give the final products. Good products of raw materials and additives that undergo critical screening will give final products that will meet the requirements of consumer and food standards and laws.

According to United Nations Industrial Development Organization (2009), it corresponds to "No one can make a good product from unsatisfactory raw materials, so every material must have a precise written buying specification so that the purchasing department can buy exactly what is required. The input (raw) materials go a long way to condition the output materials (products). The information technology slogan "garbage in, garbage out".

X_5 (Environmental hygiene and safety) rank the second due to good raw material and addictives supposed to be manufacture under good hygienic and safe environments that is free from chemical, physical, biological, or biochemical contaminations so that it does not cause any hazards or havoc to the health of the consumers. According to Adams, (1990), Environmental Hygiene and safety deals with the preservation of health through the practice of cleanliness to isolate hazardous substances.

X_2 (Top management policy and support) rank the third. They assist in handling the affairs so as to achieve a better finish product right from reception to the delivery of the products which will enhance production, processing and handling that can lead to profit to minimize cost. According to ISO 9001 series, (2012, "Leaders establish utility of purpose and

direction of the organization. They create and maintain the internal environment in which people can become fully involved in achieving the organization's objectives".

X_4 (Regulatory bodies) which rank the fourth, need to be employ due to during production, we may encounter contaminations and hazards. This support the industry to achieve assurance, reliability and control of adulteration and misbranded products thereby achieving registration number that will stand the test of time. From the literature review, regulatory bodies like NAFDAC help the food industry. They also enforce how quality standards must be done in other to control the excesses of the food and beverage industrial activities.

X_3 (Process planning and design) rank the fifth due to process design and planning of product can influences price and quality of the product. During planning and design a lot of rework, retest, and reject cannot maximize profit and its quality is negligible. According to ISO 9001 series (2012), food processing techniques should have enormous effects on the quality and nutritional value of processed foods. The amount of nutrient loss caused by food processing techniques should has encouraged some health – conscious consumers to eat more raw foods.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.0. Summary of Findings

The following findings was observed from the objectives as highlighted.

I. To identify the success factors to total quality management implementation (TQM) in manufacturing food and beverage industry
We investigated that factors needed included the following under listed

Y = Quality Management Index of food and beverage industry.

X_1 = Quality of food and beverage raw materials and addictive.

X_2 = Quality of food and beverage top management police and supports.

X_3 = Quality of food and beverage process planning and design.

X_4 = Quality of food and beverage regulatory bodies.

x_5 = Quality of food and beverage environmental hygiene and safety.

These are all significant in the study

II . To evaluate the contribution of these success factors to TQM important**.**

Factors	**t value**	**P value**	**Ranking**
X_1	-7.705	0.000	1
X_2	-4.580	0.000	3
X_3	0.712	0.479	5
X_4	2.102	0.039	4
X_5	-5.139	0.000	2

Source: Regression result in appendix 2

III.The third objective of this research work is to determine the impact of these factors to total quality management in manufacturing food and beverage industry. means that x_1 (quality of food and beverage raw materials and addictive's) is the important factor in predicting quality management index in food and beverage industry, raw materials is the input which if properly handled can lead to accept of output, therefore raw material in food and beverage industry should be subjected to critical screening, followed by x_5 (quality of food and beverage environment hygiene and safety), this indicates that the raw materials will have Good Manufacturing Practice (GMP) and also to be done in an environment that is hygienic, free from every physical, biological and chemical contamination and this should be safe from the manufacturing to the consumption., followed by X_2 (quality of food and beverage top management policy and support), in food and beverage industry, top management policy and support help the industry to achieve and arrive at better product which will enhance production that can lead to profit. Also, X_4 (quality of food and beverage regulatory bodies) and X_3 (quality of food and beverage process planning and design) are less important to quality management index in food and beverage industry. In order words, if x_1, x_5, x_2 are achieved in any food and beverage industry, x_3, and x_4 are not necessarily needed for good and safe products that will satisfy consumer needs and responsiveness.

This result has not doubt reflected in reality in food and beverage industry with regard to achieving high level of quality management performance index in any food and beverage industry especially in NBC Coca-Cola.

5.1 Conclusion

Based on the analysis carried out in this study, the following were made; following the fact that production is widely used in the food and beverage industry, the quality of the product must put into consideration. This prompted this study into identifying factors affecting quality management processes and thus evaluating how these factors affect quality management in food beverage industry for the purpose of control.

This result showed that;

X_1 = Quality of food and beverage raw materials and addictive is significant having the value of 0.000.

X_5 = Quality of food and beverage environment hygiene and safety is significant having the value of 0.000.

X_2 = Quality of food and beverage top management policy and support is significant having the value of 0.000.

X_4 = Quality of food and beverage regulatory bodies is significant though very close to sig. level of 0.05 having a value of 0.039.

X_3 = Quality of food and beverage process planning and design is not significant having a value of 0.479.

This research study when inculcate into food and beverage industry can minimize cost, maximize profit and help responsiveness which will help the manufacturer to satisfy consumer needs, reduce rework, retest, reject of the products and most importantly increase their health status.

This study indicated that production industry needs a good quality of raw materials and addictive, hygienic and safe environment, experienced top management that can make wise decision, policy and support, if these three are in place, regulatory bodies will have less work to do in enforcement. Though, so many hazards and contaminations are encountered at food and beverage industry, therefore regulatory bodies should not be left out. From the factors analyzed, out of five factors x_1-x_5, four factors x_1, x_2, x_4, x_5 were significant while the other factors x_3 is not significant.

When these factors that are significant is not properly controlled during production, poor quality products will be encountered. Therefore, for Coca-Cola company or any other food and beverage industry to achieve products that will meet requirements and standards, proper adherence to these factors that are significant should be employed.

5.2 Recommendations

Based on the findings from this study the following recommendations are made. It is recommended that Quality of raw materials and addictive, Quality of environmental hygiene and safety, Quality of top management policy and support and monitoring of regulatory bodies should be incorporated into food and beverage industry. Also, this will go a long way in employing a project manager and holding him with high esteem in food and beverage industry because they can enhance production and oversees the affairs of the customers in a better way. This topic supports further research finding on the other factors. Also, food and beverage industry should not neglect these factors which can contribute to the success of the products.

This study is able to identify the factors that affects quality management in food and beverage industry. Having analyzed five factors x_1-x_5. X_1 the quality of raw materials and additives must be properly analyzed to see that adequate control and effective utilization, so as to achieve products that will meet the consumer requirements. The environmental hygiene and safety, top management policy and support should not be neglected as they all contribute effectively to the success of the product. When all these are in place, regulatory bodies will have no or less work to do. Though they are significant to the success delivery of the project thereby making sure that each product satisfies the standards and laws of the stipulated products

5.3 Contribution to Knowledge

The knowledge gained in this research works would help organizations especially food and beverages industries when implemented to improve the understating of project managers, human resource personnel and quality departments to further deepen production output thereby increasing return on investment The academic community also is not left out in the gains and in-depth knowledge is gained while making references to this research work. This work gives us good understanding of the techniques and factors to be considered in the implementation of TQM in food beverage and manufacturing company. The major contribution is that these shall equip companies on how to deploy these factors in the course of optimal utilization of production processes in these sector and acts a resource pool for knowledge driven optimization processes for TQM implementation.

It could also help product and software developers to know what factors to consider in the development of software in that industry so as to be able to design the requisite and environment friendly software in food and beverage industry.

5.4 Recommendations for further studies:

In this work we have studied, it is recommended that there are aspect that needs more studies to be done. Such includes development of a product software that be able to determine the TQM worthiness of a company. In other word we can use these to categorise companies in the food and beverage industry and it would be easy to rank companies accordingly. We can have a project topic such as Product Software in TQM implementation in food and beverage companies also another project could be the impact of factors in TQM implementation in food and beverage industry.

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Appendix 1

Department of Project Management Technology,
Federal University of Technology Owerri,
P.M.B. 1526,
10th May, 2019

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

I, Eke Chidiebere Solomon a Master's Degree student with Reg. number **20174080368** in the above-named department in Federal University of Technology Owerri. I am carrying out a research on the topic: Evaluation of factors affecting quality management in Nigeria bottling Company, Portharcourt Plant. in which your company has been selected as a study. The aim of this questionnaire is to get firsthand information from you so as to run a successful research on this topic.

I implore you to respond to the questions as best as you can without bias as I promise to use the information with strict confidentiality and for this academic purpose only.

Thanks for your anticipated response in this regard.

Yours faithfully,

Eke Solomon C.

QUESTIONNAIRE

Please read through each of the statement below and rate the items below using: **SA:** Strongly Agree, **A:**Agree,**N**: Neither agree nor disagree, **SD**: Strongly disagree, **D**: Disagree.

Top Level ☐ Senior Mgt. ☐ Mid-Level ☐

Experience level 5-10 yearss s ☐ 10-15 y ☐ 15-20 years ☐

20years and above ☐

S/N	STATEMENT	SA	A	N	SD	D
	X_1: Quality of food and beverage raw materials and additives:					
1	Contaminated or low-quality raw materials or additives endangers the success of quality management system					
2	The choice of quality raw materials and additives determines the quality of the finished product					
3	Raw materials perishability threatens the quality management system					
4	Multiple Supplier/vendor system increases variations of raw materials which jeopardizes the quality management system					
5	Mishandling of additives and raw materials as well as Improper recycling of wastes/by-products affects the quality of final products					

S/N	X_2: Quality of food and beverage top management policy and support:	SA	A	N	SD	D
1	Incorporating quality into the corporate policy of an organization empowers the quality management system					
2	Management's commitment to invest in product Quality innovations strengthens the organization's quality management system					
3	Management's interest in Sustaining and sponsoring quality related issues through continuous improvement encourage quality management in the organization.					
4	Top manager's contribution through the corporate culture of recognizing, rewarding, training and developing employee in quality matters reflects in the quality of final products					
5	The capability of strategic managers to implement and enforce employee compliance to quality standards drives their quality management system					

S/N	X_3: Quality of food and beverage Process planning and design:	SA	A	N	SA	D
1	Systematic and strategic planning of production processes eliminates unforeseen sources of variation that appears in final products.					
2	Detailed process design reduces product variation by building quality into the production process and controls sudden changes in quality demands					
3	The overall quality of products can be enhanced by continuous improvement of the quality of the processes directly or indirectly related to their creation					
4	Quality comes not from inspection, but from improvement of the process that produces it					
5	Process automation, layout (arrangement) and synchronization increase production system uniformity which controls product variability					

S/N	X_4: Quality of food and beverage regulatory bodies:	SA	A	N	SD	D
1	The credibility of standards laid down by regulatory bodies depends on the extent of political autonomy enjoyed by the regulatory bodies					
2	Regulatory bodies fail to meet statutory quality requirements due to poor standardization and enforcement					
3	The director of regulatory documents must be recreated and periodically updated through research and development so as to synchronize with trends developing in the quality.					
4	Companies are supposed to meet certain quality standards both in performance and specification set by the formulating agency. The regulatory bodies inspect for these standards.					
5	Lack of managerial competency and Poor harmonization of standards are regulations with industrial trends is a major setback on effectiveness of regulatory bodies to handle quality surveillance system.					

S/N	X_5: Quality of food and beverage environmental hygiene and safety:	SA	A	N	SD	D
1	Safety guarding the physical contact between hazardous environment and food products encourages good quality management systems					
2	Environmental/sanitary inspections and periodic medical checks on employee health status improve quality management standards.					
3	Excess use of hazardous insecticides, preservatives, colourant set challenges on the quality management of food products					
4	Environmental protection through waste and pollution management reduces threats of food poisoning that endanger quality management.					
5	Security against malicious rivals in the business environment compliments an organization's quality management system					

S/N	Y: Quality management index in food and beverage industry:	SA	A	N	SA	D
1	Quality of Raw materials determines the quality of finished products					
2	Raw materials are the major concern in quality management systems					
3	Top management are the custodian of quality management					
4	Management policy and support decides the quality management					
5	Process planning and design is inevitable in quality management					
6	Detailed planning and design reduces cost of quality management					
7	Regulatory bodies controls the quality management of organizations					
8	Regulatory bodies are independent of firm's quality management					
9	Environmental hygiene is the major factor in quality management					
10	Only safe environment can guarantee effective quality management system					

Thank you for your cooperation and help

REGRESSION

/DESCRIPTIVE MEAN STDDEV CORR SIG N

/MISSING LISTWISE

/STATISTICS COEFF OUTS R ANOVA

/CRITERIA=PIN (.05) POUT (.10)

/NOORIGIN

/DEPENDENT VAR00006

/METHOD=ENTER VAR00001 VAR00002 VAR00003 VAR00004 VAR00005

/RESIDUALS DURBIN

Regression

[DataSet1] C:/Documents and Settings/EKE CHIDIEBERE SOLOMON/My Documents/JENY DATA. Sav

Description Statistics

	Mean	Std. Deviation	N
Y	38.2603	2.10177	73
X1	22.0959	1.22661	73
X2	20.9041	1.60004	73
X3	20.4658	.88321	73
X4	19.2877	1.88915	73
X5	22.4932	.86800	73

Correlations

		Y	X1	X2	X3	X4	X5
Pearson Correlation	Y	1.000	-.452	.061	.061	.341	-.246
	X1	-.452	1.000	-.760	.535	-.294	-.006
	X2	.061	-.760	1.000	-.725	.156	-.155
	X3	.061	.535	-.725	1.000	.268	.204
	X4	.341	-.294	.156	.268	1.000	.183
	X5	-.246	-.006	-.155	.204	.183	1.000
Sig. (1-tailed)	Y	.	.000	.303	.304	.002	.018
	X1	.000	1.000	.000	.000	.006	.480
	X2	.303	-.760	.	.000	.093	.094
	X3	.304	.535	.000	.	.011	.042
	X4	.002	-.294	.093	.011	.	.060
	X5	-.018	-.006	.094	.042	.060	.
N	Y	73	73	73	73	73	73
	X1	73	73	73	73	73	73
	X2	73	73	73	73	73	73
	X3	73	73	73	73	73	73
	X4	73	73	73	73	73	73
	X5	73	73	73	73	73	73

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	X5, x1[a], x4, X3, x2		Enter

All requested variables entered

Dependent variable: Y

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Method
1	766[a]	586	.555	1.40170	1.903

Predictors: (Constant), X5, X1, X4, X3, X2

Dependent variable: Y

ANOVA[b]

Model	Sum of Square	df	Mean Square	F	Sig.
Regression	186.415	5	37.283	18.976	.000[a]
Residual	131.640	67	1.965		
Total	318.055	72			

Predictors: (Constant), X5, X1, X4, X3, X2

Dependent variable: Y

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	109.057	12.294		8.871	.000
X1	-1.695	.220	-.989	-7.705	.000
X2	-.943	.206	-.718	-4.580	.000
X3	.236	.332	.099	.712	.479
X4	.238	.113	.214	2.102	.039
X5	-1.025	.199	-.423	-5.139	.000

Dependent Variable: Y

Residuals Statistics[b]

	Minimum	Maximum	Mean	Std. deviation	N
Predicted Value	34.3158	42.5663	38.2603	1.60907	73
Residual	-4.01118	4.08533	.00000	1.35216	73
Std. Predicted Value	-2.451	2.676	.000	1.000	73
Std. Residual	-2.862	2.915	.000	.965	73

Dependent Variable: Y