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# Effect of Materials Inspection on Product Quality in Health Sectors

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***Abstract***
*The objective of this research was to assess the effect of materials inspection on product quality in health sector. Specifically, (Ridge Hospital). This research covered managers from Ridge hospital, staffs at supervisor and lower level. The samples involved in the study were 20 staffs. The staffs were selected using a multi stage stratified clustering method. The study result indicated that there is lack of motivation to boost the morale of staff to do effective inspection. The objectives of the study were to highlight the methods of raw materials inspection and its impact on quality of products at Ridge hospital, to identify the function responsible for inspection at the ridge hospital. There is the need to employ quality functional deployment. This will enable quality systems to be built on customer needs and wants and also exceed customer expectations. When this is done it will help in addressing the issues of poor customer relations as well as prevent loses of customers as a result of not meeting customers' expectations. It is highly recommended that companies which have not subscribed to quality standards/awards subscribe to a quality award system. This will go a long way to boost customer confidence all over the world in the health sectors. Another recommendation is that material inspection improvement efforts in ridge hospital should be appreciated. There should be systems for recognition and appreciation of quality efforts in order to motivate the staff to work effectively.*

***Keywords****: Materials Inspection, Product Quality, Supply Chain Management, Materials Management*

## 1.0 INTRODUCTION

The ideal situation for inspection is of course one in which no inspection is necessary. This is because the quality assurance effort cooperatively mounted by the purchaser and supplier has resulted in outstanding quality performance and reliable supporting supplier generated records. However not all organizations have reached this enviable goal, examining some of the more common ideas surrounding inspection and quality control is useful conversely. Adequate drafting or written of specification of materials to be delivered by suppliers is not always a guarantee to ensure quality material in an organization there is need for the inspection of materials coming into the organization to ensure that supplier provides materials that conform to the quality expected. The purpose of inspection is to ensure that supplier has delivered item that corresponds to the organizational specification or description of the organizational product or services, their product and services must be watched with care until they have got to prove themselves dependable. Unfortunately, two production methods skills even of established supplier change from time to time. Operators becomes careless, errors are made and occasionally a seller may try to reduce production costs to the point where quality suffers. Thus, for a variety of reasons, if is poor policy for buying organization to neglect inspection methods or procedures. Therefore, the verification of the quality of incoming materials is an important task by any concerned in order to ensure quality materials and also to provide the customer service required level.

Apparently, in the hospital, there had been increased in the number of substandard items or products ranging from organizational goods to the consumers goods, therefore, the reasons for that is total negligence upon inspection which automatically result to many substandard products found way into production process and warrant to poor quality products. In consideration of the money spent on materials acquisition, inspection is very vital. The researcher observed that in many organizations purchasing and supply aim that is responsible for acquisition of materials has not been given the right to exercise their profession that will take care of inspection, for that we can see procurement activities has been snatched from the procurement officers by other officers of different background at all levels, such backgrounds include: account, marketing, human resources, management, engineering, architecture, medical line, even social development. It was also observed that in the organization the decision for inspection of coming materials into firms has been left to man by the functional staff of the firm, which the research believed to be bad practice, because this function is very critical and the decision to inspect materials purchased by many concern should be made by the top management cadre of the organization in order to formulate good policy and strategic decision to enhance quality service. Lack of motivation to boost the morale of staff to do effective inspection, to this effect the study seeks to improve on procurement practices to determine how transparent the inspection goes and occurrence of possible weaknesses on product quality in health sectors

## 2.0 LITERATURE REVIEW

In connection with the objectives of the research study, this chapter focuses on various authors view and other researchers own view which is related to the research topic, effect of materials inspection on product quality in health sectors a case study of Ridge Hospital.

### 2.1 The Concept of Inspection

According to **Farrington, 2010,** inspection is an important tool to achieve quality concept. It is necessary to assure confidence to manufacturer and aims satisfaction to customer. Inspection is an indispensable tool of modern manufacturing process. It helps to control quality, reduces manufacturing costs, eliminate scrap losses and assignable causes of defective work. The inspection and test unit is responsible for appraising the quality of incoming raw materials and components as well as the quality of the manufactured product or service. It checks the components at various stages with reference to certain predetermined factors and detecting and sorting out the faulty or defective items. It also specified the types of inspection devices to use and the procedures to follow to measure the quality characteristics. Inspection only measures the degree of conformance to a standard in the case of variables. In the case of attributes inspection merely separates the nonconforming from the conforming. Inspection does not show why the nonconforming units are being produced. Inspection is the most common method of attaining standardization, uniformity and quality of workmanship. It is the cost art of controlling the production quality after comparison with the established standards and specifications. It is the function of quality control. If the said item does not fall within the zone of acceptability it will be rejected and corrective measure will be applied to see that the items in future conform to specified standards. **Weele, 2011.**

### 2.2 Types of Inspection

With regards to the concepts of inspection, **Lyson and Farrington, 2011**, highlight the various types of inspection. These include:

**Floor inspection:** In this system, the inspection is performed at the place of production. It suggests the checking of materials in process at the machine or in the production time by patrolling inspectors. These inspectors move from machine to machine and from one to the other work centers. Inspectors have to be highly skilled. This method of inspection minimizes the material handling, does not disrupt the line layout of machinery and quickly locate the defect and readily offers field and correction.

**Centralized inspection:** Inspection is carried in a central place with all testing equipment; sensitive equipment is housed in air-conditioned area. Samples are brought to the inspection floor for checking. Centralized inspection may locate in one or more places in the manufacturing industry.

**Combined Inspection** Combination of two methods whatever may be the method of inspection, whether floor or central. The main objective is to locate and prevent defect which may not repeat itself in subsequent operation to see whether any corrective measure is required and finally to maintain quality economically.

**Functional inspection:** This system only checks for the main function, the product is expected to perform. Thus an electrical motor can be checked for the specified speed and load characteristics. It does not reveal the variation of individual parts but can assure combined satisfactory performance of all parts put together. Both manufacturers and purchasers can do this, if large number of articles is needed at regular intervals. This is also called assembly inspection.

**First piece inspection:** This is particularly used where automatic machines are employed. Any discrepancy from the operator as machine tool can be checked to see that the product is within in control limits. Excepting for need for precautions for tool we are check and disturbance in machine set up, this yields good result if the operator is careful

**Pilot piece** inspection**:** This is done immediately after new design or product is developed. Manufacturer of product is done either on regular shop floor if production is not disturbed. If production is affected to a large extent, the product is manufactured in a pilot plant. This is suitable for mass production and products involving large number of components such as automobiles aero planes etc., and modification are design or manufacturing process is done until satisfactory performance is assured or established.

**Final inspection:** This is also similar to functional or assembly inspection. This inspection is done only after completion of work. This is widely employed in process industries where there are not possible such as, electroplating or anodizing products. This is done in conjunction with incoming material inspection.

### 2.3 Methods of Inspection

There are two methods of inspection, according to **(O'Hair et al., 2001).** They are: 100% inspection and sampling inspection.

**100% Inspection:** This type will involve careful inspection in detail of quality at each strategic point or stage of manufacture where the test is involved is non-destructive and every piece is separately inspected. It requires more

number of inspectors and hence it is a costly method. There is no sampling error. This is subjected to inspection error arising out of fatigue, negligence, difficulty of supervision etc. Hence, completer accuracy of influence is seldom attained. It is suitable only when a small number of pieces are there or a very high degree of quality is required. Example: Jet engines, aircraft, medical and scientific equipment.

**Sampling Inspection:** In this method randomly selected samples are inspected. Samples taken from different patches of products are representatives. If the sample proves defective, the entire concerned is to be rejected or recovered. Sampling inspection is cheaper and quicker. It requires less number of Inspectors. It is subjected to sampling errors but the magnitude of sampling error can be estimated. In the case of destructive test, random or sampling inspection is desirable. This type of inspection governs wide currency due to the introduction of automatic machines or equipment which are less susceptible to chance variable and hence require less inspection, suitable for inspection of products which have less precision importance and are less costly. Example:
Electrical bulbs, radio bulbs, washing machine etc.

### 2.4 Objectives of Inspection

- To detect and remove the faulty raw materials before it undergoes production.
- To detect the faulty products in production whenever it is detected.
- To bring facts to the notice of managers before they become serous to enable them discover weaknesses and over the problem.
- To prevent the substandard reaching the customer and reducing complaints.
- To promote reputation for quality and reliability of product

### 2.5 Purpose of Inspection

There are a lot purposes of for inspection is conducted. These are the following:

- To distinguish good lots from bad lots.
- To distinguish good pieces from bad pieces.
- To determine if the process is changing.
- To determine if the process is approaching the specification limits.
- To rate quality of product.
- To rate accuracy of inspectors.
- To measure the precision of the measuring instrument.
- To secure products-design information.
- To measure process capability.

### 2.6 Advantages and Benefits of Inspection

- Detection of errors of the source reduces scrap and rework.
- Correction is done before it affects further production, resulting in saving cost of unnecessary work on defective parts.
- Material handling time is reduced.
- Job satisfaction to worker as he can't be held responsible for bad work at a later date.
- Greater number of pieces can be checked than a sample size.
- Does not delay in production.

### 2.7 Disadvantages of Inspection

- Delicate instruments can be employed.
- Measuring or inspection equipment have to be recalibrated often as they are subjected to wear or dust.
- High cost of inspection because of numerous sets of inspections and skilled inspectors.
- Supervision of inspectors is difficult due to vibration.
- Pressure on inspector.
- Possibility of biased inspection because of worker.

#### 2.7.1 Other Drawbacks of Inspection

Following are the disadvantages of inspection:

- Inspection adds to the cost of the product but not for its value.
- It is partially subjective, often the inspector has to judge whether a product passes or not.
- Fatigue and Monotony may affect any inspection judgment.
- Inspection merely separates good and bad items. It is no way to prevent the production of bad items.

**2.8 Role of Inspection and Testing in Maintaining Product Quality**

It is important for an organization that the quality of the products is maintained when they are delivered to the customers since the product quality is the top most drivers for the success of the organization. However, in the organization, employees do make mistakes and machines and equipment do have breakdowns. These results into the production process getting destabilize which in turn cause production of the products which do not meet with the requirements specified in the standards and specifications. (Feigenbaum et al., 2010). Hence, there is necessity of inspection and testing so as to ensure that the products delivered to the customer are complying with the specification as required by the customer. Inspection and testing measure and determine the quality level of the products. These are the activities or techniques used to verify the product quality as well to ensure that the results of the manufacturing process are the same as was expected. Inspection and testing activities are done to uncover the defects in the products and reporting to the production management who make the decision to allow or deny product release. (Verma et al., 2012)

Inspection and testing during the process of the manufacture of a product are the most common methods of attaining standardization, uniformity, and quality of workmanship. These are the process of controlling the product quality by comparing it with the established standards and specifications. It is one of the operational parts of the quality control. During the inspection and testing, If the product does not fall within the zone of acceptability then it gets rejected and corrective measures are required to be taken by the production management so as to ensure that the product manufactured further conform to specified standards and specifications. Inspection and testing are indispensable tools of manufacturing process since they help to control quality, reduce manufacturing costs, reduce rejection losses, and assign causes for the production of defective product. Inspection and testing procedures are followed before, during, and after the product manufacturing for ensuring that the level of quality of the product is as per the standards and the specifications. **(**Feigenbaum et al., 2010).

Inspection is an activity which generally occurs outside a laboratory, often at the place where the product is being produced. Inspection is primarily focused on the appearance, construction, and basic function of the product. It is the quality control function which is carried out, during the manufacturing of the product by an authorized inspector. The function includes measuring, examining, testing, gauging or otherwise comparing the findings with applicable requirements. The authorized inspector is an employee who is properly qualified and has the authority to carry out the inspection, **(**Boniello, 2016).

**2.9 Quality Control**

Quality Control is a system of routine technical activities, to measure and control the quality of the inventory as it is being developed. The QC system is designed to: Provide routine and consistent checks to ensure data integrity, correctness, and completeness; Identify and address errors and omissions; Document and archive inventory material and record all QC activities. QC activities include general methods such as accuracy checks on data acquisition and calculations and the use of approved standardized procedures for emission calculations, measurements, estimating uncertainties, archiving information and reporting. Higher tier QC activities include technical reviews of source categories, activity and emission factor data, and methods.

**2.10 Quality Assurance**

Quality Assurance (QA) activities include a planned system of review procedures conducted by personnel not directly involved in the inventory compilation/development process. Reviews, preferably by independent third parties, should be performed upon a finalized inventory following the implementation of QC procedures. Reviews verify that data quality objectives were met, ensure that the inventory represents the best possible estimates of emissions and sinks given the current state of scientific knowledge and data available, and support the effectiveness of the QC, (Kannan and Tan, 2015).

**2.11 Benefits of Inspection Accreditation**

O'Hair et al., (2001) state that, there are a lot of benefits that are generated from inspection. These include:

**Minimize risk**: Throughout the world today, businesses and customers seek reassurance that the products, materials or services they produce or purchase meet their expectations or conform to specific requirements. This often means that the items are inspected to determine their characteristics against a standard or a specification. For the manufacturer or supplier, choosing a technically competent inspection body minimizes the risk of producing or supplying a faulty product.

**Avoid expensive re-inspection**: Inspecting products and materials can be expensive and time consuming. If the quality of the inspection is poor, the consequences can be expensive; as well as the need for re-inspection, if a

product has failed to meet specifications or customer expectations, it may lead to product recalls, rework, litigation and reimbursement. If re-inspection is required, it is invariably damaging to the reputation of the supplier or manufacturer too. Choosing a technically competent inspection body minimizes the chance of additional inspection being required.

**Enhance your customers' confidence**: Confidence in a product is enhanced if clients know it has been thoroughly evaluated by an independent, competent inspection body. This is particularly so if a product supplier can demonstrate to their customers that the inspection body itself has been evaluated by a third party. Increasingly customers are relying on independent inspection evidence, rather than simply accepting a supplier's word that the product is "fit for purpose".

**Reduce costs and improve acceptance of goods internationally**: Through the KENAS Inspection accreditation, technically competent, accredited inspection bodies receive international recognition, which allows their inspection reports to be more readily accepted in other economies. This recognition helps to reduce costs for manufacturers and exporters by reducing or eliminating the need for additional inspection in the importing economy

**2.12 Benefits of Quality Control Inspections**

Maronox, 2014, stated that Quality control is focused on fulfilling quality requirements, and as related to clinical trials, it encompasses the operational techniques and activities undertaken within the quality assurance system to verify that the requirements for quality of the trial-related activities have been fulfilled. Quality assurance, on the other hand, is focused on providing confidence that quality requirements are fulfilled. As related to clinical trials, it includes all those planned and systemic actions that are established to ensure that the trial is performed and the data are generated, documented and reported in compliance with GCP and the applicable regulatory requirements. Quality control is generally the responsibility of the operational units and quality is infused into the outputs and verified as they are being generated. Therefore, quality control is an integral part of the daily activities occurring within each operational unit. Quality assurance is the responsibility of the quality assurance department. The mission of a quality assurance department is to provide an effective and efficient quality assurance system and counsel for the operational units.

The quality assurance department must be manned by an adequate number of dedicated and adequately qualified and trained personnel with well-developed interpersonal skills. The well-developed interpersonal skills will provide the quality assurance personnel with persuasive, diplomatic, tactful and resilient qualities generally required of them High levels of quality are essential to achieve Company business objectives. Quality, a source of competitive advantage, should remain a hallmark of company products and services. High quality is not an added value; it is an essential basic requirement. Quality does not only relate solely to the end products and services a Company provides but also relates to the way the Company employees do their job and the work processes they follow to produce products or services. The work processes should be as efficient as possible and continually improving. Company employees constitute the most important resource for improving quality. Each employee in all organizational units is responsible for ensuring that their work processes are efficient and continually improving

**2.13 Pre-Production Inspection**

The Pre-Production Inspection (PPI) is completed after the identification and the evaluation of your vendor / factory and right before the beginning of the actual mass production. It can be completed at the factory or at the vendor office. The aim of the Pre-Production Inspection in Ghana is to make sure your vendor understands your requirements and the specifications of your order and is prepared for its production. **(Kannan and Tan, 2015).**

**2.14 What do us check during a Pre-Production Inspection?**

Raw materials and key components of your order, relationship between the factory and the vendor, understanding of your demands by the factory, samples, costs, production schedule and processes, in-house quality control checks and key persons from the vendor and factory (production manager, people who speak English etc). **(Kannan, 2015).**

**2.15 What is the benefit of the Pre-Production Inspection?**

The Pre-Production Inspection in Ghana will help you to setup the preliminary production test to match the golden sample. By this inspection, you will get a clear vision of the production schedule and get ahead of any possible problems that could affect the quality of your goods. Most of the time, the main reason for production issues and poor quality is not the factory's lack of know-how but rather misunderstandings between you and the manufacturer, which often come from culture and language differences. The Pre-Production Inspection in Ghana will allow you to get past this communication gap and make sure both parties understand each other. **Feigenbaum et al., (2010)**

**2.16 Inspection**

Validating the specifications, value and safety of your raw materials, products and assets. Intertek's diverse range of inspection services can provide trusted support for your products, projects and processes. Independent third-party inspections help clients around the world protect their financial, branding and legal interests throughout the entire supply chain - from raw materials and finished goods to plant facilities and assets. We offer inspection services to manufacturers, retailers, traders, plant operators, governments and other buyers and sellers of materials and products in the world's markets, **(**Boniello, 2016). Inspections help minimize the risk of defective products by ensuring they meet both customer standards and industry and government regulations. This serves to protect your business interests, help manage your risk and ensure quality products are manufactured and delivered to their final destination at the specifications of the customer. Experienced inspectors help identify products and shipments which may contain non-standard or non-compliant components and materials. Products and materials that we routinely test and inspect include consumer goods such as clothes, toys, cosmetics, and food, to high-value bulk commodity cargoes such as agricultural products, crude oil, chemicals and refined petroleum products during critical transportation, custody transfer and storage operations. We also support the life management of plant facilities such as power plants and oil refineries with inspection and testing, ensuring that your assets are operating safely and reliably. Manufacturing product exhibits several quality characteristics. Quality inspection becomes a crucial way to verify product conformance to requirements.

Under certain inspection procedures, we may identify whether the product quality conforms to specifications or not. If the product quality fails to conform, many possible reasons come include problems from the preceding manufacturing process. Performance of the manufacturing equipment is substantial to preserve the production process. The well- maintained equipment ensures the high-quality product. The roles and advantages of quality inspection and equipment maintenance have been individually well addressed in literatures. The investigations on these two aspects of inspection and maintenance, suggest realizing their relationships as such a way to preserve better quality assurance. However, the link between them has not been sufficiently investigated and modelled. This paper proposes a general framework of interaction between inspection and maintenance, which provide a comprehensive managerial thinking in equipment maintenance. Two approaches are offered to preserve useful initiation of possible joint optimization model for future research identification of defects in the products before they arrive at the final inspection stage increases the efficiency of the entire operation by avoiding further processing of defective products. In process inspection and testing aims to prevent manufacture of the products of unacceptable quality.

Whenever a production run is started, it is prudent to check the first piece before the main run commences. Many defects can be detected by the checking of the first piece off and this can prevent the whole batch from going wrong. The purpose of patrol inspection is to help the operator to make the whole run correctly. Operator inspection means that instead of the inspector, the operator carries out the inspection during manufacturing. Last piece inspection and testing is carried out on the last item manufactured in the batch. This allows action to be taken to rectify faults in the machine and/or tools before beginning the production of the next batch. Semi-finished material is the product of preceding process and the feed material for the succeeding process in a multi-process operation. Inspection and testing of the semi-finish materials is done to segregate the material which has become off in the specification and to stop its further processing.

Inspection and testing of finished material is the last stage when finished materials are inspected and tested and is carried out after manufacture of the product has been completed, with the object of making sure that the products meet the requirements of concerned specification needed by the customer before their dispatch to the customer. These are done to see that the products which do not meet the quality requirements are either rejected or downgraded. The tests to be carried out and the measuring instruments or the test equipment to be used and the criteria for deciding acceptance of the product with respect to each characteristic are to be determined based on the requirements of standards and the product specification. Inspection and testing is to be done as per the sampling plan such as size of sample and the criteria of acceptance to be followed as specified in the standard and specification. It is necessary to exercise suitable control over the movement of the product through the inspection and testing area in order to avoid a mix-up of accepted and rejected products.

Accurate instruments and equipment are necessary to perform inspection and testing. Measuring instruments and testing equipment used for inspection and testing are to be calibrated periodically to verify their accuracy. It is necessary that the calibration is linked to some national or international standards. It is necessary to continually monitor the performance of inspectors since the reliability of inspection is very often affected by the inspector. Some defects are more difficult to find and require more patience. Inspectors vary in their ability to detect the defects in the products and the detected defect level which has been reported can affect the acceptance/rejection of the product. Samples with known defects are to be used to evaluate and improve the inspectors' performance. Training of the inspectors is the most effective way of improving reliability of inspection. Inspection carried out for the checking of

the product quality is mostly non-destructive in nature and hence it is also sometimes called 'non-destructive inspection (NDI). Only in some cases product deterioration takes place during inspection. Inspection can be done either by the visual inspection or can involve sensing technologies such as dye penetrant test, ultrasonic test or other common methods of NDI. Inspection can be done manually or automatically. Automatic inspection is carried out either by contact sensing instruments or by non-contact optical measurements. Optical inspections are generally automated. Inspection can be accomplished with a direct physical presence or remotely such as a remote visual inspection. Testing of the products for checking the product quality is normally done in the testing laboratories but sometimes it is done at the shop floor by using mobile testing equipment. Testing of the product is done

- To check physical properties like density or specific gravity, dimensional tolerances, product shape, and temperature etc.
- To check mechanical properties such as tensile strength, yield strength, percent elongation, hardness, impact strength, and fatigue strength etc.
- To check the metallurgical properties such as macro and micro examination for product's macro-structure or micro-structure, and fracture analysis etc.
- To check the corrosion properties
- To check the electrical properties
- Many other properties which are specific to certain products such as coating thickness in case of coated products, refractoriness and apparent porosity etc. In case of refractories, reactivity in case of lime, TDS and acidity etc. In case of water and many more.

Most of the testing methods are destructive in nature but there are some testing methods which are non-destructive in nature. Examples of non-destructive testing methods are magnetic particle testing, radio-graphical testing, electro- magnetic testing, and eddy current testing etc. There are wide varieties of testing equipment and methods. Some involved manual operation such as wet analysis. In such manual operations the experience of testing personnel counts a lot. On the other end of the spectrum, there are fully automated testing equipment which are having computerized controls such as spectrometers and computerized testing machines etc. During the testing of the products, besides sampling method, preparation of the sample for testing is also very importance. A sample which is not properly prepared can cause erroneous results and the tested properties may not be representative.

For checking the product quality, inspection is normally carried out (i) to find out physical imperfections (such as surface defects and internal defects etc.), (ii) to check the quantity (such as numbers, volume, and weight etc.), (iii) to check the physical dimensions (such as length, width, height, and thickness etc.), (iv) to check the nominal size (usually done for the bulk raw materials), and (v) to check the physical appearance (such as brightness, dullness, rusting, weathering, colour, solid, liquid etc.). Inspection of the product can be carried out (i) on line at the shop floor during the manufacture of the product, (ii) offline in the product storage after the product has been manufactured, or (iii) in the laboratory. Inspection of the purchased materials can be done (i) at the supplier premises, (ii) in the organization before it is unloaded, or (iii) at the material storage. Identification of defects in the products before they arrive at the final inspection stage increases the efficiency of the entire operation by avoiding further processing of defective products. Whenever a production run is started, it is prudent to check the first piece before the main run commences.

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## 3.0 METHODOLOGY

This chapter describes the methodological approach to the study. It includes a description of the research design, population of the study, sample and the sampling technique. Also included is a presentation on the development of research instrument, data collection and analysis procedures

### 3.1 Research Design

In order to achieve meaningful result in this research work, the methodology will be purely on survey research work and will be given a particular attention- using mental scheme of solving the research problems in a systematic manner within the circumstances of the researcher. Robbert Kreithner (1980) sees research design as the plan, structure and strategy of investigation concerned so as to obtain answers to research questions and control variance. It is therefore a blue print for all data and information collected, also specified the method and procedure for acquiring the information needed.

### 3.2 Sources of Data

In order to ensure the availability of data structures and information needed to resolve decision and information research problem, the researcher used both primary and secondary data on packaging for this study. Data was collected through the use of structured questionnaires. There searcher administered the questionnaire personally such that the possibility of clarifying issues with the respondents could be done instantly.

#### 3.2.1 Primary Source

Questionnaires were used as the main instrument for gathering primary data. The researcher designed and administered questionnaires to staffs of Ridge Hospital to know their opinion on the effective performance measurement on inventory. Forty (40) questionnaires were self-administered. Both open ended and closed ended questions were used in collecting this data. The open-ended questions allowed the respondents to suggest other answers unknown to the researcher and also avoid the bias of the list response possibilities, it allows the respondents to make an input into the research, and the respondents express their views about the subject in detail and through this, hidden issues were uncovered. Close ended on the other hand also help the researcher to force respondents to answer some specific questions needed for the study.

#### 3.2.2 Secondary Data

Secondary data are historical data structures of variables previously collected and assembled for some research problem or opportunity situation other than the currents situation. Secondary data for this study was obtained from relevant text books, journals, magazines, and internet and company reports.

### 3.3 Sample and Sampling Procedure

Ridge hospital is an organisation with over (50) staff in the procurement department. Out of that, a total of twenty (20) staffs were reached with the research questionnaire. According to Punch (1998), one cannot study everyone, everywhere, doing everything and so sampling decisions are required not only about which people to interview or which events to observe, but also about settings and processes. In view of this, randomly selected inventory managers from the departments of the institution were selected for the study. The purposive sampling technique was adopted. The intention was to gain an insight into the phenomena hence, the need to choose personnel who are connected with the inventory practices in the Organisation.

**3.4 Development of Research Instrument**

The study's objectives and research questions basically informed the design of the questionnaire. Before the design of the questionnaire, a thorough literature search was also made to determine and categorized concepts and variables used in other studies which related to the topic of study. Information from the literature reviewed centered on issues related to inventory management of goods and services within private and public entities globally, in Africa, and in Ghana.

**3.5 Sampling and Sampling Technique**

A total of twenty (20) staffs of Ridge Hospital were reached with the research questionnaire. The purposive sampling technique was used to sample the respondents of the study. The advantage of the purposive sampling according to Bailey (1994) is that, it enables researchers to use their skills and prior knowledge of the subject to select respondents. In the application of this sampling method, Kumekpor (2002) advised selecting the units not through random procedures, but by intentionally picking them for the study. This is because they satisfy the selection criteria which are not randomly distributed in the population but are typical of the characteristics of interest to the study.

**3.5.1 Questionnaires**

It is set questions relating work, submitted to a number of people working in the organisation under study, in order to collect statistical information. The questions were administered to limit the respondent for easy analysis. That is where a list of answers was given out to enable respondents choose any, considered appropriate. When you ask a question you intend to find out: Why something took place? Why did that happen? When something took place? When did that happen? The questions were also used to enable the respondent use his/her discretion in answering the questions. The questions also give the respondent an opportunity to make further clarification in his or her answers.

**3.5.2 Personal Interview**

This is a face to face encounter between the researcher and respondent. This was used to find an interesting and relevant data, which might not be asked in the questionnaire. A personal interview was conduct primarily with the procurement officer and other staff members of the organisation.

**3.6 Data Collection Methods**

The data collection was done by visiting individual departments with a questionnaire. The researcher introduces himself to the staffs of the various departments and was directed to the appropriate persons in charge of procurement. Questionnaires were left with the appropriate personnel in charge of procurement for the necessary responses. The completed questionnaires were subsequently collected later. The responses were edited and coded for proper use. The data collection method using the collection instruments were done as follows: The researcher had to request for face - to - face interviews with key respondents and other procurement practitioners for responses which will complement those received through questionnaires. Through the interviews qualitative data were collected from respondents. Personal observations were also made during conducted procurement committee sittings. Care was taken in order not to be bias but to come out with objective interpretations of how procurement of works, goods and services were conducted. The researcher used focus group discussions consisting of ten respondents. The discussions cantered on procurement practices to determine how transparent they were and occurrence of possible weaknesses.

**3.7 Data Analysis Method**

In the view of Emery and Couper (2003), raw data obtained from a study is useless unless it is transformed into information for the purpose of decision making. The data analysis involves reducing the raw data into a manageable size, developing summaries and applying statistical inferences. Consequently, data collected from primary and secondary sources were edited to detect and correct, possible errors and omissions. The analysis was done also to ensure consistency across responses received from respondents. Data collected via questionnaire administration, interviews and interactions with other officials, as well as statistical records on procurements practices and its effect on corporate performance. The data was collated and analysed using the appropriate statistical techniques such as distribution tables, percentages, bars and pie charts. The Microsoft Excel was used. Information such as specific comments and issues raised by respondents were also analysed and summarized into tables.

**4.0 DATA ANALYSIS**

This chapter presents and analyzes in details the data collected from the questionnaire administered to the respondents in both qualitative and quantitative form to provide useful information. It thus involves the use of both

quantitative and descriptive analysis to transform the data into meaningful information. Statistical tool as tabulation was used in the analysis.

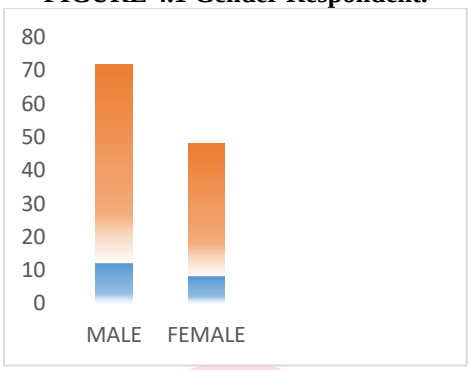
**4.1 Analysis and Discussion**

**Table 4.1: Gender of Respondent**

| Response | Frequency | Percentage% |
|---|---|---|
| Male | 12 | 60 |
| Female | 8 | 40 |
| **Total** | **20** | **100** |

**Research Data, 2018**

**FIGURE 4.1 Gender Respondent.**



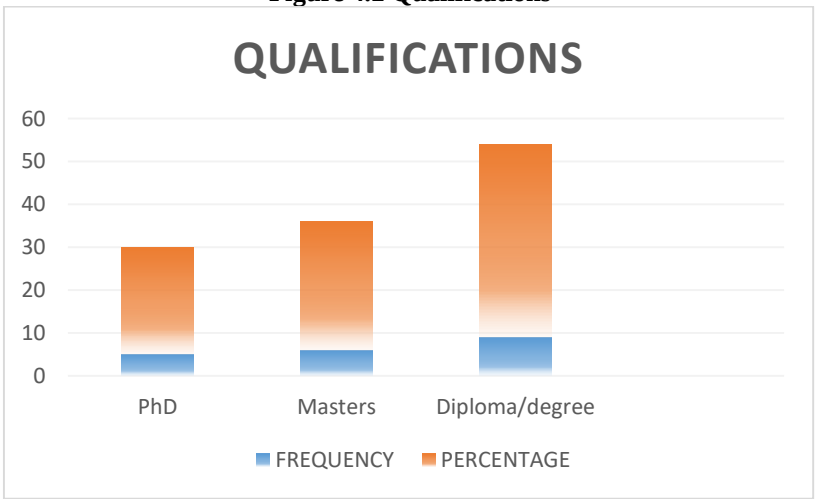

According to table 4.1, twenty (12) respondents ticked male whiles ten (8) of the respondents also ticked female. It could therefore be revealed that, there are more males at Ridge hospital than that of the females, representing 60% and 40% respectively.

**Table 4.2: Qualifications**

| Response | Frequency | Percentage % |
|---|---|---|
| PhD | 5 | 25 |
| Masters | 6 | 30 |
| Diploma/degree | 9 | 45 |
| **Total** | **20** | **100** |

**Source: Research Data, 2018**

**Figure 4.2 Qualifications**




According to figure 4.2, 9 respondents representing 45% have attained diploma/degree and is also the majority with such qualification. 6 respondent representing 30% have masters and 5 respondents representing 25%

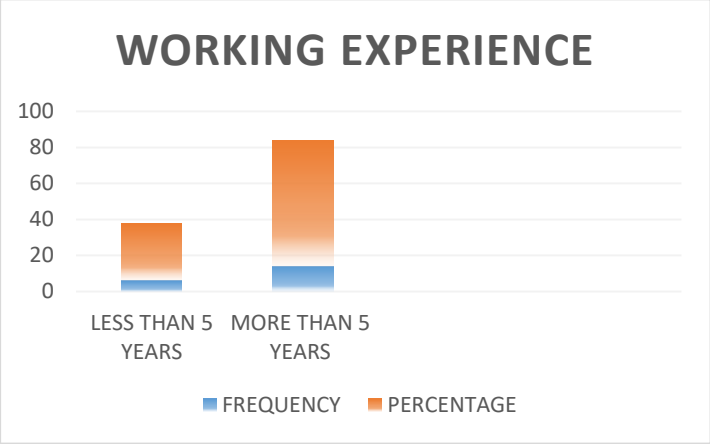
have PhD. This field work then confirms that the level of education of respondent have effect on the level of service in Ridge hospital.

**Table 4.3 How Long Have You Been Working For Ridge Hospital**

| Working Duration | Frequency | Percentage |
|---|---|---|
| 1.Less than 5 years | 6 | 30 |
| 2.More than 5 years | 14 | 70 |
| TOTAL | 20 | 100 |

**Source: Field Data 2018**

**FIGURE 4.3 Working Experience**




From Table 4.3, it can be realized that out of twenty (20) respondents interviewed, 6 of them representing 30% said that they have been working in Ridge Hospital for less than five (5) years, whiles 14 of them also interviewed representing 70% also said that they have been working in mother of Ridge Hospital for more than five (5) years. These shows that many of the workers at Ridge Hospital has been in the hospital for more than five years.

**Table 4.4 Training on Materials Inspections**

| Training on material inspections | Frequency | Percentage |
|---|---|---|
| Strongly Agree | 11 | 55% |
| Agree | 9 | 45% |
| Disagree | 0 | 0 |
| Strongly Disagree | 0 | 0 |
| Total | 20 | 100 |

**Source: field data 2018**

**4.4 Training on Material Inspections**

**Section 4.8** deals with training of personnel on material inspections. From the table below, it is clearly evident that all respondents have gone through some kind of training on material inspections

**Table 4.5 Effectiveness of Material Inspection**

| Material inspection | Frequency | Percentage % |
|---|---|---|
| Strongly Agree | 0 | 0 |
| Agree | 12 | 60 |
| Neutral | 0 | 0 |
| Disagree | 8 | 40 |
| Strongly Disagree | 0 | 0 |
| Total | 20 | 100 |

**Source: Field data 2018**

Table 4.5 gathered that 60% of respondents agree that materials inspection is effective. On the other hand, 40% of respondents are with the view that material inspection is not effective.

### 4.6 Relationship between Material Inspection and Success of the Health Sectors

**Table 4.6** clearly shows that there is a positive relationship between material inspection and success of the health sectors. From the table it can be seen that a total of 89% of respondents agreed that they success of their respective hospital can be attributed to material inspection.

**Table 4.6 Relationship between Material and Success of the Health Sectors**

| Relationship between material inspection and success of health sectors | Frequency | Percentage % |
|---|---|---|
| Strongly Agree | 7 | 35 |
| Agree | 6 | 30 |
| Neutral | 7 | 35 |
| Disagree | 0 | 0 |
| Strongly Disagree | 0 | 0 |
| Total | 20 | 100 |

**Source: field data 2018**

### 4.7 Frequency of Materials Inspection

Information on the frequency of undertaking material inspection are captured in **section 4.7**. From table 4.7 below, it can be understood that material inspection are done on monthly, quarterly and sometimes yearly. Figure 4.7 shows the chart view of this information.

**Table 4.7 Frequency of Material Inspection**

| Frequency of Reworks Done | Frequency | Percentage % |
|---|---|---|
| Monthly | 7 | 35 |
| Quarterly | 7 | 35 |
| Half-yearly | 0 | 0 |
| After every activity | 0 | 0 |
| Yearly | 6 | 30 |
| Total | 20 | 100 |

**Source: field data 2018**

## 5.0 CONCLUSION

This chapter draws the outcome of the presentation made in chapter four. It concludes on the findings received from the questionnaires administered to the respondents. Conclusions and recommendations made by the researcher can also be found in this chapter.

### 5.1 Summary of Findings

From the investigation, a number of concerns on materials inspections on product quality in health sectors were revealed. The findings have been summed up bellow; Information gathered from the questionnaire showed that employees have been taken through training in material inspection on product quality in health sectors and as such are well knowledgeable in issues of material inspection. According to employees in the company, the training on material inspection has impacted positively on their performance. Nonetheless, they are disadvantaged by the unavailability of such resources to help them produce to meet standards. In an attempt to find out the challenges that are faced by Ridge hospital in implementing material inspection, issues such as low quality of materials, quality education and training programs for workers to drive the improvement process in the hospital and employee commitment to and interest in the quality programs in the company do not pose challenges to the firms. On the other hand, the most daring challenges include; delay in supply of materials , absence of a clear strategy for quality management in the company, top management focus on performance in the short term and absence of rewards for and appreciation of the achievement of individuals.

**5.2 Conclusion**

The study sought to assess the concerns on materials inspections on product quality in health sectors specifically, Ridge hospital. The study concluded that good health practices exist in these companies. Another conclusion which was drawn from the findings was that the material inspections are not being implemented to the highest level. Again management inactions undermine leadership commitment to quality and render material inspection ineffective. For example the necessary resources required to carry out quality inspection were not readily available. From the findings of the research one can emphatically conclude that there is a positive relationship between material inspection and operational performance of Ridge hospital.

**5.4 Recommendation**

In the light of the findings and conclusions, the following recommendations are hereby proposed: Efforts must be made to implement material inspection which are not being effectively practiced so as to help improve on organizational performance. There is the need to employ quality functional deployment. This will enable quality systems to be built on customer needs and wants and also exceed customer expectations. When this is done it will help in addressing the issues of poor customer relations as well as prevent loses of customers as a result of not meeting customers' expectations. It is highly recommended that companies which have not subscribed to quality standards/awards subscribe to a quality award system. This will go a long way to boost customer confidence all over the world in the health sectors. Another recommendation is that material inspection improvement efforts in Ridge hospital should be appreciated. There should be systems for recognition and appreciation of quality efforts in order to motivate the staff to work effectively. There is the need for the company to purchase modern equipment which would make the inspection process more efficient and also help reduce the cost of service.

**References**

Adza-Awude K. (2012). Assessment Of Total Quality Management Practices On Organisational Performance At Intravenous Infusions Limited Koforidua. Kwame Nkrumah University of Science and Technology.

Abraham M, Crawford J. and Fisher T. (1999). Key factors predicting effectiveness of cultural change and improved productivity in implementing total quality management. International Journal of Quality & Reliability Management 16: 112- 132.

Ahire S. L and Dreyfus P. (2000). The impact of design management and process management on quality: an empirical examination. Journal of Operations Management .

Ahire S. L Golhar D. Y and Waller M. A. . (1996). "Development and validation of TQM implementation constructs". Decision Sciences.

Allen R. S. and Kilmann R. H. (2001). The role of the reward system for a total quality management based strategy. Journal of Organizational Change 14(2): 110-131.

Anderson E. W, Fornell C. and Lehmann D. R. (1994). Customer satisfaction, market share, and profitability: findings from Sweden. Journal of Marketing, Vol. 58, July, pp. 53-66.

Anderson J. C. Rungtusanatham M. and Schroeder R. G. (1994). A theory of quality management underlying the Deming management method. Academy of Management Review.

Andreas S and Martha G. L. (November 2009). Policy Note: The Pharmaceutical Sector in Ghana. (n.d.).

Arumugam V, Chang H. W, Ooi K. B. and Teh P. L . (2009). Self-assessment of TQM practices: a case analysis. The TQM Journal.

Arumugam V, Ooi K. B. and Fong T. C . (2008). TQM practices and quality management performance- an investigation of their relationship using data from ISO 9001:2000 firms in Malaysia. The TQM Magazine.

Bergquist T. and Ramsing K. (1999). Measuring performance after meeting award criteria. Quality Progress 32(9): 66-72.

Bhatti MI, Awan H. M (2003). An Evaluation of ISO 9000 Registration Practices Manage. Finance. (n.d.).

Bilich F. and Neto A. A. (2000). Total quality management: quality macro-function model for banks. Total Quality Management.

Black S. (1993). Measuring the critical factors of total quality management. University of Bradford: Unpublished Ph.D. thesis.

Black S. E. and Porter L. J. (1996). Identification of the Critical Factors of TQM. Decision Sciences.

Brah S. A, Serene T. S. L. and Rao B. M. (2002). Relationship between TQM and performance of Singapore companies. International Journal of Quality and ReliabilityManagement, Vol. 19 No. 4, pp. 356-79.

Brown A. and van der Wiele T. (1996). Quality management selfassessment in Australia. Total Quality Management .

Bru, A . (2010). Critical success factors of six sigma implementation in Italian companies. International Journal of Production Economics.
Chase R. B, Aquilano N. J and Jacobs F. R. (2001). Operations Management for Competitive Advantage. ninth ed. McGraw-Hill, Boston, MA.
Cheroigin K. S. (2014) Total Quality Management And Performance Of Multinational Pharmaceutical Firms In Nairobi, Kenya. (n.d.).
Claver-Cortés E, Pereira-Moliner J, Tarí J. J. and Molina-Azorín, J. F . (2008). TQM, managerial factors and performance in the Spanish hotel industry. Industrial Management and Data Systems.
Dale B. G . (1999). Managing Quality. Blackwell Business, Oxford.
Dale B. G. (2003). Managing Quality, 4th ed. Blackwell Publishers, Oxford.
Dale B.G. (2003), Managing Quality, 4th ed., Blackwell Publishers, Oxford. (n.d.).
Davood G, Hossein R, Mohammed R. F and Arshad F. (2013). Total Quality Management and Organizational Performance. American Journal of Industrial Engineering.
Demirbag M, Tatoglu E, Tekinkus M and Zaim S. (2006). An analysis of the relationship between TQM implementation and organizational performance: Evidence from Turkish SMEs. Journal of Manufacturing Technology Management, Volume 17, No. 6, pp. 829-84.
Demirbag M, Tatoglu E, Tekinkus M. and Zaim S. (2006). An analysis of the relationship between TQM implementation and organizational performance: evidence from Turkish SMEs. Journal of Manufacturing Technology Management.
Easton G. S. and Jarrell S. L. (1998). The effects of total quality management on corporate performance. An empirical investigation. Journal of Business 71(2): 253- 307.
EFQM . (1999). The EFQM excellence model. Brussels. European Foundation for Quality Management (EFQM).
EFQM (1996). Self-assessment. Guidelines for companies. Brussels, European Foundation for Quality Management (EFQM). (n.d.).
Evans J. R. and Dean J. W. (2003). Total quality: Management, organisation and strategy (3rd ed.). Mason: Thompson South-Western.
Feigenbaum A. V. (1991). Total Quality Control. McGraw-Hill, Inc. New York, NY.
Flynn B. B, Sakakibara S and Schroeder R. G . (1995). "Relationship between JIT and TQM: practices and performance". Academy of Management Journal.
Flynn B. B, Schroder R. G. and Sakakibara S. (1994). A framework for quality management research and an associated measurement instrument. Journal of Operations Management.
Flynn B. B. and Saladin B. (2001). Further Evidence on the Validity of the Theoretical Models Underlying the Baldrige Criteria. Journal of Operations Management.
Foley K. J. (2003). From quality management to organizational excellence:-Don't throw the baby out with bath water. http://www.cmqr.mit.edu.au/publications/ kfbabyba.pdf. (n.d.).
Fotopoulus C. B. and Posmas E. L. (2009). The impact of soft & hard TQM elements on quality management results. International Journal of Quality and ReliabilityManagement, Vol 26, no 2, pp 150-163.
GAO (1991). Management practices. U. S. companies improve performance through quality efforts. Report No. GAO/NSIAD-91-190, Washington D.C., U. S. General Accounting Office (GAO). (n.d.).
Garvin D. A. (1987). Competing on the eight dimensions of quality. Harvard Business Review , Nov-Dec.
George S. (2002). Bull or bear? Quality Progress 35(4): 32-37. (n.d.).
Glover J. (1993). Achieving the organizational change necessary for successful TQM. International Journal of Quality &Reliability Management 10: 47-64.
Handfield R, Jayaram J and Ghosh S . (1999). An empirical examination of quality tool deployment patterns and their impact on performance. International Journal of Production Research.
Hasan M. and Kerr R. M. (2003). The relationship between TQM practices and organizational performance in service organization. The TQM Magazine, Vol.15, No.4, pp. 286-291.
Hellsten U. and Klefsjö B. . (2000). TQM as a management system consisting of values, techniques and tools. The TQM Magazine .
Hoang D. T, Igel B. and Laosirihongthong T. (2006). The impact of total quality management on innovation: findings from a developing country. International Journal Quality and Reliability Management.
Jeng Y. C. (1998). Performance evaluation of ISO 9000 registered companies in Taiwan. The TQM Magazine, Vol. 10, No. 2, pp. 132-138.
Junkins J (1994). Insights of a Baldrige Award winner. Quality Progress27(3):57- 58. (n.d.).
Terziovski M . (2006). Quality management practices and their relationship with customer satisfaction and productivity improvement. Management Research News.

Trent R. J and Monczka R. M . (1999). Achieving world-class supplier quality. Total Quality Management.
Van der Wiele A, Williams A. R. T. and Dale B. G. (2000). Total Quality Management. Is it a fad, fashion, or fit? . Quality Management Journal .