

ROLE OF QUALITY CONTROL STRATEGIES ON SUPPLY CHAIN PERFORMANCE IN THE PUBLIC SECTOR: A CASE STUDY OF KITUI COUNTY GOVERNMENT IN KENYA

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Abstract

Various quality control strategies are being adopted in a bid to ensure the performance of the supply chain is improved. In the present study, four quality control strategies were reviewed; delivery inspection, supplier evaluation and certification, supplier involvement, and design specification and how they influenced the performance of the supply chain. The study adopted a case study research design, with Kitui county government being the institution where the study was conducted. A sample was used to select respondents from procurement department and finance and account department in the county. Primary data was collected through the use of questionnaire with Likert scales which were sent to the respondent via email. The data was checked for completeness, accuracy, errors in responses, omissions as well as all the other forms of inconsistencies. The data was then assigned numerical codes according to categories. This was followed by classification, tabulation and summary of data through the use of descriptive measures. The data was presented using frequency distribution tables, charts and figures. Pearson's correlations coefficients was run to examine the relationship among the independent and the dependent study variables that are set out in the objectives of the study. Multiple linear regression results have shown that four predictors can explain 60.5% of change in Supply chain performance namely. According to the research findings, Effects of delivery inspections, supplier evaluations, supplier involvement and design specifications, were found to be statistically significant with a positive impact on supply chain performance. The study recommended that the inspection and acceptance committee should be up to the task to ensure that immediately after the delivery of the goods, works or services inspection and where necessary, test of the goods received is done. Again, the study observes that the goal of supplier evaluation and certification should be supplier performance improvement. The study also recommends that County government should work closely with suppliers in the effort of ensuring quality in the county to reap the benefits associated. Lastly, specifications should be prepared considering various factors such as quality, sales potential, availability of raw materials, consumers' acceptability.

Keywords: *design specifications, delivery inspections, supplier involvement and supplier certifications*

1. INTRODUCTION

In the contemporary business world characterised by ever-increasing pressure on prices, the competitive struggle is moving from price competition towards quality. To meet the increasing demands of the customers, the organizations focus their efforts and management strategies to meet these needs through continuous improvement of their products and processes (Goetsch, & Davis, 2014). This is leading to the enrichment of the quality concept, which acquires an integrative dimension throughout the entire organization. The process of procurement and management of material resources play a crucial role in ensuring quality, because the quality of the materials supplied determines the quality of final products (Montgomery, 2009). In accordance with ISO 9001: 2008, keeping under control the process of procurement the management of material resource is a mandatory requirement.

Quality management can be perceived as a management approach made of its principles, strategies and technique. According to ISO 9000, and ISO 9000: 2005, ISO 9001: 2008, ISO 9004: 2009 standards, an organization can achieve sustainable success by implementing a quality management system designed to continuously improve performance, taking into account the most important expectations, those of the customers, shareholders, suppliers and those of the community. Part of the organization's management system, the quality management system aims at streamlining the organization's processes, adding value, lowering costs and increasing adaptability to the needs of the customer. In a quality management-oriented approach, the processes of procurement and management of material resources can be defined as a set of interdependent, logically linked and value added sub-processes, which takes place within the organization in order to ensure and manage the elements necessary to conduct business in an efficient and effective manner.

The importance of quality management is illuminated by numerous researches that has been conducted over the past decade. According to Anisimova (2014), quality is one of the key requirements of the contemporary life, the main issue of quality might be outlined by customers' satisfaction. A customer requires and expects a product or service according to their own understanding of it and, as a result, this product or service can be either found by its perception or not. Thus, quality should be managed and controlled through all processes within an organization. To establish and maintain quality, companies and organizations are adopting quality management into their strategies. According to Yang (2006), quality management practices including quality management, process management, employee empowerment and teamwork, customer satisfaction management, quality goal setting and measurement supplier's cooperation and quality tools training have positive effects on customer satisfaction and that the adoption of QM principles is an effective means by which companies can gain competitive advantage.

Quality control strategies have been adopted by organizations from numerous parts of the world. In the United States according to Awoku (2012), such strategies have been widely applied successfully by many manufacturing companies to improve their process, increase profits and organizational performance. The most applied quality strategies include ISO 9001, Total Quality Management (TQM), Just-In-time (JIT), Lean Management and Six Sigma. The urge for quality strategies in the U.S. traces its origin the 1970s and 1980s when many U.S. companies lost market share to foreign competition. Foreign manufacturing companies were producing lower-priced products and better quality. As the West continued to add luxury to products in order to sell at higher prices and increased profits, the East was busy adding quality to products in order to produce items better and cheaper. In order to increase quality awareness, the ISO family standards and Malcolm Baldrige National Quality Award were established in 1987. The Malcolm Baldrige National Quality Award was established to recognize U.S organizations for their achievements in quality and performance, and also to

raise awareness about the importance of quality and performance excellence as a competitive edge (Montgomery, 2009).

In European Union and China, increased focus on development of quality strategies have been occasioned by rise in number of product recalls. For instance, between 2005 and 2010, the number of recall cases in EU countries due to quality and safety problems doubled. The impact of quality risks involves various industries. In some serious cases, the so called highly reputable companies being famous for excellent quality performance in the past are not immune from the impacts, from major recalls in the car-industry like Toyota (Kumar and Schmiz 2011), to the food industry in China, and even down to simple low technology manufacturing in China as in the toy industry (Tse and Tan 2011). Marucheck et al., (2011) suggested that quality control problems might be due to changes in global production systems and the increasing complexity of supply chains. Since many firms have moved their production off-shore, it becomes more difficult to assure the quality and safety of their products with such a long supply chain. This phenomenon is also reflected in the statistics of product recalls in the EU. In 2010, more than half of consumer product recall cases in the EU were made in China (RAPEX 2011). In these product recall scandals, all the parties including the governments, consumers and manufacturing firms, would like to promptly remove the defective/unsafe products from the marketplace (BRC 2007). The costs involved in such undertakings is pushing companies to adopt appropriate quality strategies.

In Nigeria, according to Chukwu, Adeghe, & Anyasi, (2016), most organizations perform dismally because of non-implementation of quality strategies. They are ignorant of implementing this quality strategies like TQM and this is why they are not reaping the benefits such as cost reduction, defect rate reduction, quality improvement etc. According to Chukwu et al., (2016), Nigerian industries are losing huge sum of money annually through non implementation of TQM. Total Quality Management streamlines cost effective system and process that reduces overhead and improves performance. There is need to sensitize Nigerian organizations on the benefits of implementing TQM. According to Dumka (2018), the Nigerian business environment is highly volatile with frequent changes in work processes, practices and employees motivation. Thus, corporate bodies that do not respond quickly often have problems, which in the long-run affect their productivity levels. Competition has become so high in all fronts that the time is now, when organizations will only survive by customers in every area of organizational life have taken the center stage. Also, the continual wave of technological and environmental change have turned several organizations into by standers on the road to the future, and have made their structures, processes and skills becomes progressively less attuned to the ever changing realities of the demands and expectation of the present day customers (Bergman, & Klefsjö, 2010). Quality improvement strategies are therefore becoming a core requirement for all organization that want to survive in the rapidly changing environment.

In Kenya, various researchers have examined various quality control strategies and their impact on performance. According to Masindet and Ogollah (2014), the importance of quality strategies such as TQM for organizations in Kenya, cannot be underestimated in terms of cost reduction, efficiency, effectiveness and supply chain performance through process and product improvement. According to Siongok and Ismael (2016). The embracement of Information Technology (ICT) and development of Financial Management Information System (IFMIS) similar to ERP started in 1998 and implementation in 2015 by all ministries and State Corporation, County Governments and all other government entities is aimed at quality improvement especially in the procurement sector. The ultimate goal of ERP is to enhance the quality of public service delivery by providing timely and accurate financial and accounting information across both the National and County Governments. One of the functionalities of IFMIS is the Procure and makes payment online as well as to automate procurement process from requisition, tendering, contract award to payment.

Njuguna (2013) and Mutua (2014) found that there was a positive relationship between quality management and supply chain performance in the manufacturing industry. Ngina (2014) found, lack of modern technology, resistance to change, top management commitment and organizational culture were the main challenges towards implementation of quality management strategies in Kenyan companies.

The introduction of the public procurement and Asset Disposal Act (PPADA) of 2015 and the Procurement Regulations of 2013 and enactment of Public Procurement Oversight Authority (PPRA) have introduced new quality standards for public procurement in Kenya (Ndumbi, & Okello, 2015). The regulations guides public procurement professionals on metrics to utilize when evaluating quality of products and services. The PPDA (2015) obliges public entities to evaluate requests of proposals using quality and cost based selection method, where the organization uses a competitive process that takes into account the quality of the proposal and the cost of the services in the selection of the successful supplier. Quality based selection method according to the Act is appropriated for complex or highly specialized assignments for which it is difficult to define precise terms of reference and the required input from the consultants, assignments that have a high downstream impact and in which the objective is to have the best experts, assignments that can be carried out in substantially different ways, assignments and professional services which are regulated by Acts of Parliament which stipulate fees and charges applicable for such assignments.

Statement of the problem

At a time when prices are subject to ever-increasing pressure, the competitive struggle moves from price competition towards quality, this becoming a competitive factor in the competitive struggle. To meet the increasing demands of the modern customers, the organizations are focusing their efforts and management strategies to meet these needs through continuous improvement of their products and processes. This has led to enrichment of the quality concept as has never been experienced before with most organization moving in haste to adopt appropriate quality control strategies. Scholars alike have become interested in the concept quality control strategies and their impact on performance of supply chain.

In their study Hassan, Mukhtar, Qureshi and Sharif (2012) examined the association between quality management strategies and performance in Pakistan's manufacturing industry. Irfan, Ijaz, Kee and Awan (2012) in their study on improving operational performance of public hospital in Pakistan, established that selected Quality management systems practices have a significant positive impact on operational performance. Gayah, (2012) in his study tries to show how human resource planning practices are affected by quality control strategies and what needs to be improved for implementing quality strategies in any firm.

In Kenya, various researchers have explored the role of quality in performance of organizations. Muthama (2016) examined total quality management strategy and how its impact on the performance of telecommunication firms in Kenya. The study found existence of statistically significance relationship between implementation of TQM practices and organizational performance in the mobile telecommunication firms in Kenya. Mutua (2014) conducted a study on quality management strategies and financial performance of cement manufacturing firms and established that most cement manufacturing firms that implemented quality management practices recorded high sales turnover leading to organizational performance. Chepkech (2014) on the study on effect of quality management practices on organizational performance concluded that quality management practices significantly affected organizational performance.

Most of the studies conducted have focusses on the performance of the organization in general or the industry (Hassan, Mukhtar, Qureshi and Sharif, 2012; Ijaz, Kee and Awan 2012; Muthama, 2016; Mutua, 2014; Chepkech, 2014). There is a need for a study that considers the influence of quality on the entire supply chain

that extend from the customer to the manufacturer. Furthermore, the existing literature have not focused on specific quality control strategies. Additionally, few researchers have focused entirely on public sector. Since, introduction of the county government in Kenya, to the best of researcher's knowledge, no known studies have been conducted on quality control strategies and their influence on supply chain performance. The present study therefore sought to fill these gaps left by the existing literature.

Objectives of the study

General Objective

The general objective of this study was to examine the role of quality control strategies on supply chain performance in the public sector with Kitui county government as the case study.

Specific Objectives

- a) To determine the role of delivery inspections on the performance of supply chain in Kitui county government
- b) To assess the role of supplier evaluations/certifications on the performance of supply chain in Kitui county government
- c) To determine the role of supplier involvement on the performance of supply chain in Kitui county government
- d) To establish the role of design specifications on the performance of supply chain in Kitui county government

2. LITERATURE REVIEW

This section presents previous studies that have been done, and theories advanced towards quality control strategies in supply chain. Therefore, it has theoretical review focusing on theories that explain quality control strategies. Secondly, it has the empirical review of the studies that have been done on quality control. A conceptual framework has been included to summarize the literature reviewed.

Theoretical Review

The underpinning theories included; institutional theory, system theory, Deming theory and Joseph Juran Theory.

Institutional Theory

Luhmann, (2010) stated that institutional theory is the traditional approach that is used to examine elements of public procurement. Eyaa et al., (2011) further noted that there is no single universally agreed definition of institution or institutional theory. Scott (2004) categorically identifies three pillars of institutions as regulatory, normative and cultural cognitive. The regulatory pillar emphasizes use of rules, laws and sanctions as enforcement mechanism, with expedience as a basis for compliance. In Kenya, public procurement is heavily regulated unlike any other profession and in the recent past attracted a lot of concern from the public. Public Procurement and Asset Disposal Act, (PPDA) 2015, Public Procurement Disposal and Regulation of 2006 and guidelines which are being issued by Public Procurement Regulatory Authority (PPRA) and Treasury, these are some of the guidelines that forms the framework of procurement system in Kenya.

Institutional theory dictates that there should be compliance with Public procurement regulations and policies to ensure there is value for money and efficiency procurement process (Thai, 2008). Jones & George (2009)

reiterated that procurement is controlled by a comprehensive system of formal rules and standard operating procedures (SOPs) that shapes and regulates the behavior of divisions, functions and individuals. SOPs and rules allow employees to perform activities efficiently and effectively. Accordingly, quality means best in purchasing as well as best for the customers and the selling price. The word control in quality represents a management tool with 4 steps namely: setting quality standards, appraising conformance to these standards, acting when standards are exceeded and planning for improvements in the standards.

System Theory

System theory is an interdisciplinary theory about every system in nature, in society and in many scientific domains as well as a framework with which to investigate phenomena from a holistic approach (Capra, 1997). System thinking arises from the shift in attention from the part to the whole (Jackson, 2003), considering the observed reality as an integrated and interacting unicum of phenomena where the individual properties of the single parts become indistinct. In contrast, the relationships between the parts themselves and the events they produce through their interaction become much more important, with the result that system elements are rationally connected (Luhmann, 1990) towards a shared purpose (Golinelli, 2009). The systemic perspective argues that it is not possible to fully comprehend a phenomenon simply by breaking it up into elementary parts and then reforming it. Instead, what is required is application of a global vision to underline its functioning.

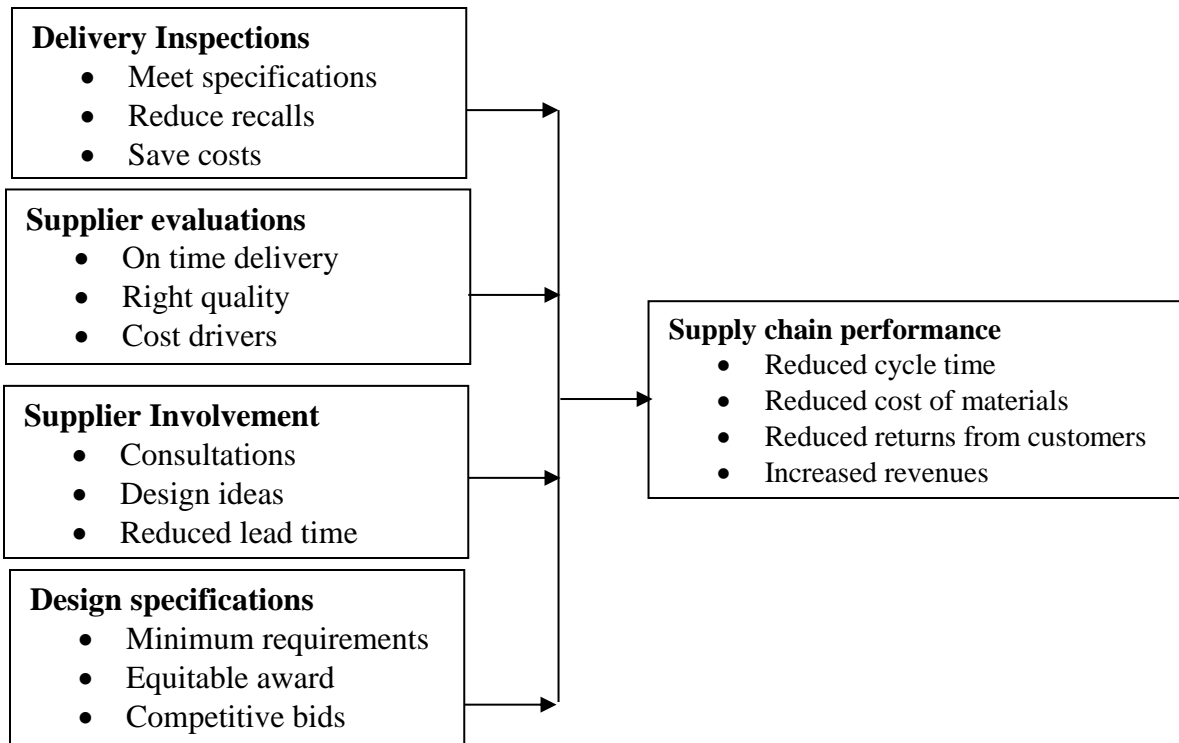
Deming Theory

Deming's theory of Total Quality Management rests upon fourteen points of management he identified, the system of profound knowledge, and the Shewart Cycle (Plan-Do-Check-Act). Deming "14 Points." are principles that help guide companies in achieving quality improvement (Mokamba, Gakure, and Keraro, 2013). The system of profound knowledge consisted; system appreciation - an understanding of the way that the company's processes and systems work, variation knowledge - an understanding of the variation occurring and the causes of the variation, knowledge theory - the understanding of what can be known and psychology knowledge - the understanding of human nature. Plan-Do-Check-Act (PDCA) is a cycle created for continuous improvement (Scudder, 2013).

Joseph-Juran theory

Joseph-Juran is responsible for the "Quality Trilogy." (Scudder, 2013) The quality trilogy is quality planning, quality improvement, and quality control (Goetsch and Davis, 2010). If a quality improvement project is to be successful, then all quality improvement actions must be carefully planned out and controlled (Scudder, 2013). Juran (1951), developed the 10 quality improvement steps which are summarized as: Build awareness of the need and opportunity for improvement, Set goals for improvement, Organize to reach the goals (establish a quality council, identify problems, select projects, appoint teams, designate facilitators), Provide training, Carry out projects to solve problems; Report progress, Give recognition, Communicate results, Keep score, Maintain momentum by making annual improvement part of the regular systems and processes of the company which were aimed to improve quality in the organization (Mokamba, Gakure, and Keraro, 2013).

Conceptual Framework



Independent Variables

Dependent variable

Figure 2.1 Conceptual Framework

Delivery inspection

Quality is important all along the supply chain, whether it checking quality at the supplier, monitoring quality along the production line, or checking final quality of the finished items before it is delivered to the customer. However, one area that is very important in the monitoring of quality is the inspection of items that arrive at the facility of the organization from the suppliers (Christopher, 2016). Ensuring that the parts and raw materials are of the correct quality or specifications before the item even enters the plant is a key aspect of ensuring total quality of the finished goods (Wauna, & Obwogi, 2015). The purchasing department negotiates with the supplier to ensure that the best quality item is purchased for the best pricing and received in a timely manner. The quality department supplies the purchasing department with specifications that the supplier agrees to and produces materials that must adhere to those specifications.

Supplier evaluations/certifications

Supplier evaluation is a term used in business and refers to the process of evaluating and approving potential suppliers by quantitative assessment. The purpose of supplier evaluation is to ensure a portfolio of best in class suppliers is available for use. Supplier evaluation is also a process applied to current suppliers in order to measure and monitor their performance for the purposes of reducing costs, mitigating risk and driving continuous improvement (Gordon, 2008). Supplier evaluation is conducted at the tender stage and can be in the form of either a questionnaire, interview or site visit to assess the supplier’s capability in terms of capacity, financial stability, quality standards, performance and organizational structure and processes in place. Both existing and potential suppliers are scored on suitability and either approved or rejected to be added onto the

approved supplier list (ASL). This helps to improve existing suppliers' performance and also can periodically ensure the organization has the right sized and fit of suppliers on its approved list.

Supplier involvement

Supplier involvement entails firms collaborating to leverage strategic positioning and to improve operational efficiency. The opportunity to improve product design performance by involving suppliers in the product development process identifies a definite need to understand better the basic structure of buyer-supplier relationships. In effect, environments that are conducive to highly co-operative relationships between buyers and suppliers are more likely to lead to supplier involvement in the product development process. By contrast, highly confrontational buyer-supplier relationships are less likely to result in early inclusion of suppliers in the product development process (Laura and Stanley 1994). This is in agreement with the findings by (Andrew, 1994) that Suppliers working closely with customers during new product development activities are the norm for successful Japanese companies, and this typically applies to all suppliers (Feng, Sun, & Zhang, 2010). While the end producer may retain the design of the key parts regarded as vital for product success, or core to the business, specialist suppliers are used to provide leading-edge technology in their specific field, whereas general component suppliers are expected to provide production knowledge, thus aiding design for manufacture.

Design specifications

The overall purpose of a specification is to provide a basis for obtaining a good or service that will satisfy a particular need at an economical cost and to invite maximum reasonable competition (Tadelis, 2012). To this end, specifications may not be unduly restrictive. By definition, a specification sets limits and thereby eliminates, or potentially eliminates, items that are outside the boundaries drawn (Jeptepkeny, 2015). However, a specification should be written to encourage, not discourage, competition consistent with seeking overall economy for the purpose intended. A good specification should do four things: (1) Identify minimum requirements, (2) allow for a competitive bid, (3) list reproducible test methods to be used in testing for compliance with specifications, and (4) provide for an equitable award at the lowest possible cost (Jeptepkeny, 2015). Design specifications customarily employ dimensional and other physical requirements of the item being purchased. "Design" in this sense means that the specification concentrates on how the product is to be put together. It is the most traditional kind of specification, having been used historically in public contracting for buildings, highways, and other public works, and represents the kind of thinking in which architects and engineers have been trained. Its use is called for where a structure or product has to be specially made to meet the purchaser's unique need.

Supply chain performance

Srinivasan (2011) defined supply chain performance for a firm as the performance of the various processes included within the firm's supply chain function. Supply Chain Performance refers to the extended supply chain's activities in meeting end-customer requirements, including product availability, on-time delivery, and all the necessary inventory and capacity in the supply chain to deliver that performance in a responsive manner. Supply Chain Performance crosses company boundaries since it includes raw materials, components, work-in-progress as well as finished products, and distribution through various channels to the end customer. It also crosses traditional functional organization lines such as procurement, manufacturing, distribution, marketing and sales, and research and development (Hausman, 2002). A supply chain performance evaluation system represents a formal, systematic approach to monitor and evaluate the performance of the supply chain (Handfield et al., 2009).

3. RESEARCH METHODOLOGY

This research adopted a case study research design with the unit of analysis being Kitui County Government. According to Kothari (2004) and Yin (2013) the case study approach involves a careful and complete observation of social units and allows the study to retain the holistic and meaningful characteristics of real life events. A case study is an in depth study of a particular situation rather than a sweeping statistical survey. It is a method used to narrow down a very broad field of research into one easily researchable topic.

The target population for the study was the employees of County Government of Kitui and specifically those working in the procurement department and Finance department. The study targeted these specific functions, as they are the responsible with the implementation of quality in the county. The two department had an estimated staff level of 115 employees. Due to several limitations, it was not possible for the researcher to evaluate all respondents when collecting data. A sample was therefore selected which has some commonality with the target population for purposes of proceeding with the research. The goal of sampling techniques is to select a reasonable number of subjects, objects, cases that represent the target population. Using Nassiuma formula (2000) given the population (N) of one hundred and fifteen (115), coefficient of variation (C) of 0.5 and the margin of error or the level of precision (e) of 0.05, the sample size (n) of the study was fifty five 55.

The study adopted a stratified sampling technique where the respondent were classified in strata that represent their departments. Each target department was represented by a number of employees proportionate to the total employees of the department. This technique is appropriate as it gives the subject equal chances of participating in the study (Mark Saunders, et al, 2009). The questionnaire, which were used to collect primary data, were open & close ended and contained a Likert scale of 5. According to Brace (2004) a Likert scale enhances the production of highly accurate finding during analysis. Pearson's correlations coefficients was run to examine the relationship among the independent and the dependent study variables that are set out in the objectives of the study. The regression model is as below.

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \varepsilon$$

Where

Y =Supply chain performance in the public sector

β_0 =Constant

X_1 = Delivery inspections

X_2 = Supplier evaluations/certifications

X_3 = Supplier Involvement

X_4 = Design specifications

$\beta_1, \beta_2, \beta_3, \beta_4$ Are regression coefficients and ε is the error term.

4. RESEARCH FINDINGS AND DISCUSSION

The study sought to examine the role of quality control strategies on supply chain performance in the public sector using the case study of Kitui County Government. This chapter presents the data analysis and interpretation of study findings. The research data was collected using open and closed ended questionnaires that covered the four different strategies of quality control in procurement and supply chain. The questionnaires were distributed to Kitui county government employees in particular those in procurement and finance

departments and collected in the same manner and analysis of the data was based on a likert scale of 1 to 5 (1- Not at all, 2-small extent, 3-moderate extent, 4-large extent and 5- very large extent)

Response Rate

In this study, the researcher sampled 55 respondents from Kitui County Government but received 40 questionnaires fully filled out of a possible 55 questionnaires. This is a response rate of 72.73%. The unsuccessful response rate was (27.27%. This commendable response rate was made a reality after the researcher made personal visits and follow-ups to get the questionnaires filled.

Babbie (2004) asserted that a return rate of 50% is acceptable for analysis and publishing. He also states that a 60% return rate is good and a 70% return rate is very good. The achieved response rate was above 70%, which implies that the response rate was very good for generalization.

Table 4.1: Response Rate

Category	Frequency	Percentage
Response	40	72.73
Non response	15	27.27
Total	55	100.0

Reliability of research instrument

Cooper & Schindler (2001) explains reliability of research as determining whether the research truly measures that which it was intended to measure or how truthful the research results are. The study dealt with different groups of experts in the field of quality management and issued them with the questionnaires. The experts were required to assess if the questionnaires helps in determining the role of quality control strategies on supply chain performance in the public sector. The coefficient of the data gathered from the pilot study was computed with assistance of Statistical Package for Social Sciences (SPSS) version 23. Cronbach’s Alpha method was used to check on the reliability and validity of the instruments used by determining the internal consistency of the scale used. Cronbach’s Alpha is a reliable coefficient that indicates how well items are positively related to one another. Cronbach’s alpha values of 0.7 and above is considered adequate. The average Cronbach’s Alpha value was 0.7148 as shown in Table 4.2 below meaning the items under each variable were consistent.

Table 4. 2: Reliability Test

Variable	Cronbach’s Alpha	No of Items
Delivery inspections	.764	6
Supplier Certifications	.721	5
Supplier involvement	.684	6
Design specifications	.715	4
Supply chain performance	.690	6
Average Cronbach’s Alpha	.7148	27

Respondents’ Distribution by Department

The respondents profile comprised of 30% respondents from Procurement department and 70% from Accounts and Finance department. This implies that majority of the respondents who participated in the study were from the accounts and finance department. This is because due to the segregation of duties requirement on matters finance, the Kitui county government naturally employs more finance and accounts specialists than procurement. It is evident that there is a fair distribution of the respondent’s participation from various

functional levels of management that directly or indirectly deal with quality management as shown in the table below.

Table 4. 3: Distribution by department

Department	Frequency	Percentage
Accounts and Finance department	28	70
Procurement department	12	30
TOTAL	40	100

Descriptive analysis

Descriptive statistics is the term given to the analysis of data that helps describe, show or summarize data in a meaningful way. Descriptive analysis was used to describe the basic features of the data in the study giving a summary about the sample and the measure. It also helped in the simplification of large amounts of data in a sensible and manageable form. It expressed the variables, frequencies, percentages, means and standard deviation.

Delivery inspections

The study sought to determine the role of Delivery inspections on supply chain performance in the public sector with Kitui County as the case study.

Table 4. 4: Percentages distribution of respondents’ perception on Delivery inspections

Delivery inspections	Not at all	Small extent	Moderate extent	Large Extent	Very large extent	Mean
Our organization conduct delivery inspection for incoming goods	0%	0%	22.5%	45%	32.5%	4.08
Our organization ensures products meets specifications in the LPO	0%	0%	8.5%	49.2%	42.4%	4.34
Delivery inspections reduce recalls	6.9%	20.7%	17.2%	27.6%	27.6%	3.48
Delivery inspections saves costs	0%	0%	16.9%	50.8%	32.2%	4.15
Delivery inspections are costly	0%	0%	32.2%	25.4%	42.4%	4.10
Delivery inspections consumes time	5%	10%	25%	37.5%	22.5%	3.76

From the table above, the findings indicate that Kitui County government conducts inspection for incoming goods where 22.5% to a moderate extent agreed while 45% to a large extent agreed to the statement. 32.5% of the respondents to a very large extent agreed. This is stipulated in the provisions of the Public Procurement and Assets Disposal Act where a committee is given the responsibility of inspecting all incoming deliveries to make sure they conform to specifications. Inspection of incoming deliveries by suppliers is done by checking whether the deliveries are in tandem to the specifications in the LPO (Mean=4.34). Inspection of all incoming deliveries plays an imperative role since it reduces instances of recalls by the supplier (Mean=3.48) and saves

costs (Mean=4.15) likely to be incurred by the procuring organizations. Respondents agreed that inspection of each incoming delivery is expensive (Mean=4.10) and consumes a lot of time (Mean=3.76). The findings of this study concurs with a research by Vanichchinchai, & Igel (2011) that 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. Conducting proper inspection at delivery therefore comes a long way in reducing the unnecessary costs in the supply chain and improve its performance.

Supplier Evaluations/certifications

The study sought to assess the role of Supplier Evaluations on supply chain performance in the public sector.

Table 4. 5: Percentages distribution of respondents’ perception on Supplier Evaluations

Supplier Evaluations	Not at all	Small extent	Moderate extent	Large Extent	Very large extent	Mean
We conduct supplier evaluations for all suppliers	0%	16.9%	16.9%	23.7%	42.4%	3.92
Supplier evaluation ensures on time delivery	0%	0%	32.2%	42.4%	25.4%	3.93
Right quality of products is delivered by certified suppliers	0%	0%	23.7%	50.8%	25.4%	4.02
The certified suppliers deliver goods at right cost	0%	0%	8.5%	49.2%	42.4%	4.34
Supplier evaluations consumes time	0%	0%	15.3%	50.8%	33.9%	4.19

The findings of this study established that Kitui county government conducts supplier evaluations for all their suppliers (Mean=3.92). This is aimed at getting the best supplier who meets the quality requirements of the procuring organization. Evaluation of suppliers is beneficial to the buying organization as it ensures that deliveries are done on time to avoid unnecessary delays (Mean=3.93). Evaluation also ensures that suppliers are certified to be able to meet quality requirements. The findings of this study also established that certified suppliers deliver goods of the right quality (Mean=4.02) and at the right cost (Mean=4.34). Supplier evaluations are also time consuming since they are procedural and bureaucratic (Mean=4.19).

Gordon (2008) argues that the purpose of supplier evaluation is to ensure a portfolio of best in class suppliers is available for use. He defines supplier evaluation as a process applied to current suppliers in order to measure and monitor their performance for the purposes of reducing costs, mitigating risk and driving continuous improvement. Supplier evaluation is conducted at the tender stage and can be in the form of either a questionnaire, interview or site visit to assess the supplier’s capability in terms of capacity, financial stability, quality standards, performance and organizational structure and processes in place. Both existing and potential suppliers are scored on suitability and either approved or rejected to be added onto the approved supplier list (ASL). This helps to improve existing suppliers’ performance and can periodically ensure the organization has the right sized and fit of suppliers on its approved list.

Supplier involvement

The study sought to determine the role of Supplier involvement on supply chain performance in the public sector.

Table 4. 6: Percentages distribution of respondents' perception on Supplier involvement

Supplier involvement	Not at all	Small extent	Moderate extent	Large Extent	Very large extent	Mean
Our organization involves the suppliers in supply chain issues	0%	0%	16.9%	57.6%	25.4%	4.08
We consult with suppliers in regard to products to be delivered	0%	0%	16.9%	57.6%	25.4%	4.08
The suppliers provides us with design ideas	0%	0%	15.3%	67.8%	16.9%	4.02
Involvement of suppliers reduce lead time	0%	0%	8.5%	49.2%	42.4%	4.34
Involvement of suppliers reduces cost of goods	0%	0%	0%	59.3%	40.7%	4.41
Involvement of suppliers ensure quality of products	0%	0%	8.5%	59.3%	32.2%	4.24

The findings of this study indicate that Kitui County Government involves and engages suppliers on supply chain issues and in particular when quality management and control is involved (Mean=4.08). Suppliers are consulted in the kind of products to be delivered (Mean=4.08) to ensure only quality deliveries that match the specifications are received by the county government. Suppliers are also involved in the design of specifications especially where the deliveries are complex and ambiguity involved (Mean=4.02). This ensures that the buying organization gets it right from the start of the procurement process. Supplier involvement helps reduce lead-time (Mean=4.34) and reduces the costs of goods (Mean=4.41). Supplier involvement also plays a very key role of ensuring that the buyer gets quality products (Mean=4.24).

Melissa et al. (2004) supports the findings of this study that many companies today are using supplier involvement strategy to gain competitive advantage. Suppliers are involved earlier in the design and development process. Their involvement ranges from simple consultation on design ideas to making suppliers fully responsible for the design of services they will supply. Some of the benefits that accrue from supply source integration therefore includes reduced development lead times, better communication, substantial costs savings from higher productivity, more reliable products with fewer recalls, enhanced customer satisfaction and improved financial performance.

Design specifications

The study sought to establish the role of Design specifications on supply chain performance in the public sector.

Table 4. 7: Percentages distribution of respondents' perception on Design specifications

Design specifications	Not at all	Small extent	Moderate extent	Large Extent	Very large extent	Mean
Our organization accurately describe the design to the suppliers	0%	17.2%	13.8%	27.6%	41.4%	3.93
The specification of design ensures suppliers meets minimum requirements	6.9%	6.9%	34.5%	24.1%	27.6%	3.59
Design specification ensure competitive bids	6.9%	17.2%	27.6%	34.5%	13.8%	3.31

Quality is improved as a result of design specification	0%	17.2%	13.8%	44.8%	24.1%	3.76
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Design of specifications is important as specifications acts a statement of requirement to communicate user requirement to the supplier. Kitui county government accurately describe the design of their requirements to the supplier (Mean=3.93). This ensures that the supplier delivers what is needed by the user (Mean=3.59). The communications should be accurate, clear and simple to understand. Design specifications ensures competitive bids are received (Mean=3.31). Proper specification of requirements improves and ascertains quality of deliveries (Mean=3.76).

Juran agrees that specifications indicate fitness for purpose or use. Specifications also communicate the requirements of a user or purchaser to the supplier; compare what is actually supplied with the requirements in terms of purpose, quality and performance stated in the specification and provide evidence, in the event of a dispute, of what the purchaser required and what the supplier agreed to provide.

Supply chain performance

The study sought to establish how Kitui County Government supply chain Performance had been affected by quality control strategies.

Table 4. 8: Percentages distribution of respondents’ perception on supply chain performance

supply chain performance	Not all	at Small extent	Moderate extent	Large Extent	Very large extent	Mean
Reduced cycle time	0%	20.3%	37.3%	33.9%	8.5%	3.31
Reduced cost of materials	1.7%	13.6%	37.3%	42.4%	5.1%	3.36
Increased revenues	0%	25.4%	39.0%	25.4%	10.2%	3.20
Reduced customer return	0%	18.6%	50.8%	22.0%	8.5%	3.20
Quality satisfaction	0%	33.9%	45.8%	13.6%	6.8%	2.93

Respondents were asked the extent to which the County government had realized business values on their supply chains because of quality control. From the findings in the Table 4.8 above its evident that the county government of Kitui has realized a wide range of benefits resultant from the quality control management. Among the listed include; Reduction of cycle time (Mean=3.31); Reduced cost of materials (Mean=3.36); Increased revenues and savings (Mean=3.20); Reduced customer return (Mean=3.20) and Quality satisfaction (Mean=2.93).

Inferential Analysis

Inferential statistics infer from the sample to the population. They determine probability of characteristics of population based on the characteristics of the sample. Inferential statistics help assess strength of the relationship between the independent variables and the dependent variables.

Correlations of the Study Variables

Table 4.9 illustrates the correlation matrix among the independent variables. Correlation is often used to explore the relationship among a group of variables (Pallant, 2010), in turn helping in testing for Multicollinearity.

Table 4. 9: Correlations of the Study Variables

Correlations		Delivery inspections	Supplier certifications	Supplier involvement	Design specifications	Supply chain performance
Delivery inspections	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	40				
Supplier certifications	Pearson Correlation	.386*	1			
	Sig. (2-tailed)	.038				
	N	40	40			
Supplier involvement	Pearson Correlation	.316	.697*	1		
	Sig. (2-tailed)	.005	.000			
	N	40	40	40		
Design specifications	Pearson Correlation	.598**	.872**	.632**	1	
	Sig. (2-tailed)	.001	.000	.000		
	N	40	40	40	40	
Supply chain performance	Pearson Correlation	.302	.341	.503**	.504**	1
	Sig. (2-tailed)	.011	.007	.005	.005	
	N	40	40	40	40	40

Table 4.9 indicate that supplier involvement and delivery inspections have significant positive relationship as attributed by the correlation coefficient of 0.316 and p-value of 0.005. This relationship is because supplier involvement is wider in scope and might extend to inspections of deliveries. Inspections is done at the departure point of the supplier or the receiving point at the buying organization place thus a positive relationship.

The results shows presence of a positive and significant weak relationship between supplier certifications and delivery inspections as proved by the p-value and the correlation coefficient (r=0.386, p=0.038). There is a strong and significant relationship between supplier involvement and design specifications since the p value of 0.000 is less than 0.05 level of significance and the correlation coefficient is 0.632. This indicates the high involvement of suppliers in the design of specifications.

The correlation matrix table shows presence of strong and significant positive relationship between supplier certification and supplier involvement (r=0.697, p=0.000). Definitely for a supplier to be evaluated and certified, then the consent of the supplier is paramount hence his involvement.

The findings also indicate a strong positive relationship between design specifications and supplier certifications with P-Value of 0.00 and r of 0.872. This means that for certifications purposes the suppliers are evaluated on how they meet specifications requirement and their expertise on design specification. There is also a positive relationship between design specifications and delivery inspections (r=0.598, p=0.001). This is because inspections of incoming goods is done to confirm whether delivery conforms specifications.

From the table, all the independent variables are positively related to Supply chain performance as attested by the respective correlation coefficients: Delivery inspections (r=0.302), Supplier certifications (r=0.341), Supplier involvement (r=0.503) and Design specifications (r=0.504). All the relationships apart are rendered significant since their p values are less than 0.05. Accordingly, the ranking of the independent variables with

their contribution supply chain performance was: Design specifications contributed more to supply chain performance of Kitui County Government (50.4%), followed by Supplier involvement (50.3%), and followed by supplier certifications (34.1%) and finally delivery inspections (30.2%).

Regression Analysis Results

This study utilized multiple linear regression analysis to examine the relationship of the predictor variables with the dependent variable. Adjusted R² which is known as the coefficient of determination was used to explain how Supply chain performance varied with delivery inspections, supplier evaluations, supplier involvement and design specifications. The model summary table shows that 60.5% of change in Supply chain performance can be explained by four predictors namely delivery inspections, supplier evaluations, supplier involvement and design specifications an implication that the remaining 39.5% of the variation in supply chain performance could be accounted for by other factors not in this study

Table 4. 10: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.806 ^a	.650	.605	.465

a. Predictors: (Constant), Delivery inspections, Supplier evaluations, Supplier involvement and Design specifications

Analysis of variance (ANOVA) was done to establish the fitness of the model used. The ANOVA table shows that the F-ratio (F=2.888, p=.044) was statistically significant. This means that the model used was appropriate and the relationship of the variables shown could not have occurred by chance.

Table 4. 11: ANOVA

ANOVA^a

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	8.716	4	2.179	2.888	.044 ^b
	Residual	18.111	24	.755		
	Total	26.828	28			

a. Dependent Variable: Supply chain performance

b. Predictors: (Constant), Delivery inspections, Supplier evaluations, Supplier involvement and Design specifications

Table 4. 12: Regression coefficients

Model	Unstandardized Coefficients			T	Sig.
	B	Std. Error	Beta		
(Constant)	.881	1.234		.714	.148
Delivery inspections	.054	.330	.038	.164	.027
Supplier certifications	.292	.421	.286	.694	.019
Supplier involvement	.269	.289	.229	.930	.000
Design specifications	.752	.660	.632	1.139	.001

a. Dependent Variable: Supply chain performance

The above table gives the results for the regression coefficient for the multiple linear equation ($Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \varepsilon$) which by supplying the coefficients becomes:

$$Y = 0.881 + 0.054X_1 + 0.292X_2 + 0.269X_3 + 0.752X_4$$

Where

Y = Supply chain performance

X_1 = Delivery Inspections

X_2 = Supplier certifications

X_3 = Supplier involvement

X_4 = Design specifications

According to the regression equation established, holding all independent factors a constant (*Ceteris paribus*) then Supply chain performance will be 0.881 units. From the regression equation holding all other independent variables a constant, a unit increase in Delivery inspections will lead to a 0.054 improvement in Supply chain performance; a unit change in supplier certifications will lead to a 0.292 increase in Supply chain performance; a unit increase in supplier involvement will lead to a 0.269 increase in Supply chain performance and a unit increase in design specifications will lead to a 0.752 increase in Supply chain performance.

However, at 5% level of significance and 95% level of confidence Delivery inspections, Supplier evaluations, Supplier involvement and Design specifications have a significance influence ($P\text{-value} < 0.05$) on supply chain performance with p-values of 0.027, 0.019, 0.000 and 0.001 respectively and therefore their coefficients should be retained in the final model.

The results further infers that of all the predictors considered in this study design specifications contributes the most to supply chain performance followed by supplier certification and supplier involvement as implicated by their larger coefficients.

5. SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary of Findings

This study sought to ascertain the role of quality control strategies on supply chain performance in the public sector with Kitui County Government as the case study. The specific objectives that guided that study included to determine the role of delivery inspections on the performance of supply chain in Kitui county government; to assess the role of supplier evaluations/certifications on the performance of supply chain in Kitui county government; to determine the role of supplier involvement on the performance of supply chain in Kitui county government and to establish the role of design specifications on the performance of supply chain in Kitui county government. This study employed a case study research design to achieve these objectives.

The study population comprised of 115 employees of Kitui county government with special focus on staff working with accounts/finance and procurement departments. This study used stratified random sampling technique. The sample size was 55 respondents achieved by use of Nassiuma sampling formula. A semi-structured questionnaire containing both open-ended and close-ended questions was used to collect primary data for this study. The questionnaires were sent to the respective respondents through emails which they provided. The questionnaires were self-administered where the respondents filled on their own and only seek

the intervention of the researcher where they couldn't understand. A pilot study was carried out among Kitui county government staff who did not take part in the main study. Data collected was analyzed using descriptive and inferential analysis methods. A multiple linear regression analysis was used to analyze the roles of delivery inspections, supplier evaluations, supplier involvement and design specifications on supply chain performance. SPSS version 23 was used to aid in data analysis. Data analysis results were presented using tables. Multiple linear regression results have shown that four predictors can explain 60.5% of change in Supply chain performance namely: delivery inspections, supplier evaluations, supplier involvement and design specifications.

Conclusions

Supply chain performance is a key focus of any company's management. This study investigated the relationship between quality control strategies and supply chain performance. Based on findings of this study, it is reasonable to conclude that quality control strategies contributed to supply chain performance of county governments in Kenya. Based on the findings of the study, the researcher inferred some important conclusions. Delivery inspections was found to be statistically significant in influencing the supply chain performance; therefore, procurement departments should ensure thorough inspection is done to all incoming goods to check conformance to specification.

Supplier evaluations and certification has a positive effect on supply chain performance. The purpose of supplier evaluation is to ensure a portfolio of best in class suppliers is available for use. There are numerous ways through which supplier evaluations and certifications enhances the performance of the supply chain.

The findings indicate that supplier involvement in quality control has a positive effect on supply chain performance. Many organizations today in the effort of quality management are using supplier involvement strategy to gain competitive advantage in their supply chains. Suppliers are involved earlier in the design and development process. Their involvement ranges from simple consultation on design ideas to making suppliers fully responsible for the design of services they will supply.

Lastly, design specifications significantly influenced supply chain performance. Design specification is important and help improve the performance of the supply chain in different ways. When a buyer has to purchase or is required to purchase a particular type of goods from more than one supplier, design specifications ensure the identity of goods purchased. Thus, the materials with identical nature can be purchased from different suppliers based on specifications only.

Recommendations

In the context of county government, the committee of inspection and acceptance should be up to the task to ensure that immediately after the delivery of the goods, works or services: inspection and where necessary ,testing of the goods received is done. Again, the committee inspects and reviews the goods ,works or services in order to ensure compliance with the terms and specifications of the contract; and Accept or reject , on behalf of the procuring entity , the delivered goods, works or services.

In sum, the goal of supplier evaluation and certification should be supplier performance improvement. While simply measuring performance has a positive effect, supplier evaluation can be most effective when it leads to continuous improvement activities and actual supplier performance improvement. Supplier evaluation systems need to address both the traditional quantitative indicators such as quality, delivery, and cost management as well as the underlying qualitative factors.

County government should work closely with suppliers in the effort of ensuring quality in the county to reap the benefits associated. Some of the benefits that accrue from supply source integration includes reduced development lead times, better communication, substantial costs savings from higher productivity, more reliable products with fewer recalls, enhanced customer satisfaction and improved financial performance.

This study recommended that specifications be prepared considering various factors such as quality, sales potential, availability of raw materials, consumers' acceptability etc. This may result in simplification of design, reduction in the quantity of materials used, increasing the productivity, decreasing the cost of production, lower selling price etc. If the suppliers combine specifications with quality control measures, the buyers have not to worry much about the testing or inspecting of the products purchased and in such circumstances buyer's money and time both are saved by doing less complete inspection.

Areas for Further Research

This study was not exhaustive by any means and therefore it is recommended that another study be replicated in other sectors of the economy, such as retailing, service, national government and private sectors. This is because quality management in supply chain is a rich research field that is still evolving. A similar research in private sector will need to be carried out over time to see if they validate, support or contradict the findings of this particular study.

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