COST OF QUALITY AND PERFORMANCE OF LOGISTICS FIRMS IN NAIROBI CITY COUNTY

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DECLARATION

This Management Research Project is my original work, and has not been presented for

any academic credit in any other academic institution.

Signed..   **Date**…………………………
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D61/70868/2014

This Management Research Project has been submitted for examination with my

approval as the University Supervisor.

Signed…………………………...   **Date**………………………………
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DEDICATION

I dedicate this project to my loving family and close friends. Lots of gratitude goes to my loving mum Jane and dad Wilson who believed in the pursuit of academic excellence and who taught me the biggest task can be accomplished if it is done one step at a time with patience, discipline and dedication. To my close and best friends Ben and Barso who prayed, stayed up, bought dinners and lunches when I was busy working to get this project done and those that have supported me through guidance in reference to their academic experiences specifically Shitote. I am entirely grateful.

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ABBREVIATIONS AND ACRONYMS

ANOVA	Analysis of Variance
KEBS	Kenya Bureau of Standards
COQ	Cost of Quality
DHL	Document Handling Limited
ICD	Inland Container Deports
ISO	International Standards Organization
KIFWA	Kenya International Freight and Warehousing Association
MPS	Materials Planning System
NEMA	National Environmental Management Authority
UPS	United Parcel Services
WBLPI	World Bank's Logistics Performance Index

ABSTRACT

This study investigated factors that effect cost of quality and performance in logistics firms in Nairobi. The cost of quality was found to be critical in the performance of firms by various scholars as corroborated in the field study. Firms can control their performance by taking care of the costs of quality which lies in the main operations of re-workings, recalls, retests and rebuilds. The specific objectives were therefore to establish the cost of quality in logistics firms, establish the performance of logistics firms and to determine the relationship between cost of quality and performance in logistics firms in Nairobi County.

To achieve the study objectives, a census of 45 logistics firms that have operated within the last 10 years was conducted. Field data collection used structured questionnaires administered through drop and pick system. Data analysis involved descriptive statistics using mean and standard deviation for cost of quality, while performance used sales volumes. A regression linear model was used to determine the relationship between the cost of quality and performance of logistics firms in Nairobi County.

The study identified several factors including re-testing, recalling, rebuilding and re-workings that clearly played a part in the performance of logistics firms. In particular, re-tests and re-buildings were found to increase the performance while re-works and re-calls caused performance to slow down.

Based on the research findings the study recommended that logistics firms should embrace measures that encourage reduction in cost of quality to increase firm performance. It was also recommended that firms getting into partnership would help drive down the cost of quality and raise their performance levels. Finally it was recommended that training special teams and having departments for recalls, re-workings, re-tests and re-builds was appropriate as this reduced the cost of quality and increased the likelihood of better performance.

CHAPTER ONE: INTRODUCTION

1.1   Background of the Study

The term quality has been used by various people to mean differently but generally, quality has become one of the core factors for almost all manufacturing and service companies that aim to win sufficient orders. On the other hand, logistics firms are key to most supply and demand functions and hence, improving quality is considered to be one of the important strategies to attain customer loyalty in today's complex global competitive environment where demand and supply have come to close scrutiny by stakeholders (Tai et al, 2010).

Logistics systems are expensive leading to the clear categorization of quality costs into two areas: costs of control and costs of failure of controls. The cost of quality is usually best understood in terms of the sum of costs of conformance and the costs of non-conformance (Crosby, 1980; Chopra & Garg, 2012; Aziz & Noor, 2013). As logistics covers the flow of materials or services from the provider to the purchaser, risks belong to the strategic risks of the broad risk portfolio. Similarly, in terms of the overall impact, logistics risks fall into the category of high probability of occurrence and severe loss. Bai and Sarkis (2010) in their studies came to the conclusion that great effort should be placed to manage logistics risks in the supply chain. Chopra and Garg (2012) examined that the effect of dynamic pricing as a mean to deal with the risks in the supply chain. They found that the introduction of additional demand information does not always benefit the buyer as the suppliers can use the demand data and receive logistic quantities in the first period so as to adjust the prices in the second stage.

It is imperative that logistics systems have to incur costs that require proper accounting to avoid unnecessary losses implying that traditional methods used to quantify the cost of quality have serious limitations that require modern approaches to deal with.   It is

therefore observed that sophisticated and reliable evaluation measures alone may not be able to identify and reduce or eliminate logistics system costs that compromise quality (Manalo & Manalo, 2010). The information for identifying such costs is the key to opening up quality adoption in modern logistics systems. This is what the study is based on with a sample of both private and public organizations to be examined for their costs of quality (Aziz & Noor, 2013).

1.1.1 Cost of Quality in Logistics Firm

Cost of quality commences with the understanding of the concept of lean manufacturing which according to Monalo and Monalo (2010) is a management philosophy combined with a set of processes and methodologies which can eradicate and minimize the waste from the production processes. Modern business has concluded that the critical success factors in any business environment are identifying the activities which do not add value and removing them from the process of manufacturing or providing service (Ramudhin *et al*, 2008). Through lean manufacturing, managers are able to integrate the customer desires and needs into the core of the business. Studies have indicated that there are positive effects on all the aspects of production costs, including the quality costs when lean production is practiced (Aziz & Noor, 2013).

Wang and Yuan (2009) defined cost of quality as the expenditure incurred by the producer, by the user and by the community, associated with the quality of a product or a service. This then follows that, the related quality costs are the expenditures incurred in defect prevention activities, appraisal activities, and losses and activities due to internal and external failures. It is also important to note that lean manufacturing philosophy maintains the idea of continuous improvement as the main quality improvement strategy.

In this line of thinking, several scholars including Chopra and Garg (2011) and Omar and Murgan (2014) point to three main uses to be considered in lean manufacturing which are key to cost of quality identification. The cost of quality however is not to be taken to mean the price of producing a quality product or service. It is actually the cost of not creating a quality product (Okwiri, 2012). This means the cost of rebuilding, reworking corrections or retesting will qualify as cost of quality. Inaccuracies and guesswork cannot work in this environment of cost of quality. It also means that accurate estimation would not have been incurred if quality were to be perfected then becomes the cost of quality (Feigenbum, 2002). It is from this reasoning that cost of quality is thought to be free since a re-work or re-test could have been avoided if carried out correctly first time around (Khataie & Bulkak, 2013).

1.1.2 Performance in Logistics Firms

The concept of logistics is based and focused on acquiring goods and services at the best possible price, in the least amount of time with highest value quality per cent for any organization, public or private (Khataie & Bulkak, 2013). There has to be seen to have value for money in the investment put to that logistics process thus necessitating the need for procurement systems especially in the modern technological period. Organizational budgets in logistics firms are focused on movement of goods or provision of services at the best possible least cost system in order to affect profits positively since profits are directly a product of the cost input function. There are very many challenges facing the logistics aspect of an organization and hence the need to have carefully selected logistics systems to avoid majority of the problems or eliminate all of them. Such problems include undesired or poor quality, cost of maintenance, cost of ignorance, failure to meet customer needs, poor supply or wrong supply of goods and services, inadequate supply capacity and high cost of inventory as well as security for the whole logistics process (Yu & Shen, 2013; Chopra & Garg, 2012).

Scholars have regularly pointed out that there is no single solution to solving all the problems thought to come from logistics operations and that poor quality in logistics systems is a complex chain. There is a solution in examining several systems related to logistics including payment system, materials planning system, inventory control systems and any other system that will in one way or another be involved in the final input and output process for the logistics to be complete with high quality results (Wang & Yuan, 2009; Khataie & Bulgak, 2013).

However for all these to be a success, the logistics systems are surrounded by very challenging environment. This environment is very wide and includes economic forces, global challenges, the industry for particular goods and services, competitive market forces, social and community challenges, political and legal issues as well as company credibility and shareholder concerns. To identify a logistics system, it must have features of demand and supply forecast, location of optimum routes, ability to do inventory check and financial capabilities to balance cash transactions without any manipulation (Yu & Shen, 2013).

1.1.3 Cost of Quality and Performance in Logistics Firms

Performance is an important concept that relates to the way and manner in which financial and non-financial resources available to a firm are judiciously used to achieve the overall corporate objective of that logistics firm. Since firms cannot run by themselves, the structures and mechanisms to run them will rely on strategic and top management, cascading downwards the rest of staff in the logistics firm. In line with the logistics firm governance structures, the policies and the role of shareholders as well as and top management have the responsibility of ensuring that the pillars of good performance which include efficiency, effectiveness, continuous quality improvement, customer prioritization, and maintenance are practiced. Cost of quality practices that can lead to performance include clear guidelines on product re-workings, conformance to international standards and having high technology platforms for re-workings and re-

tests. It keeps the logistics firm in business and creates a greater prospect for future opportunities (Okwiri, 2012).

Chopra and Garg (2011) asserted that organizational performance is the integration of three broad dimensions: effectiveness, efficiency and adaptability. The measure of organizational performance can be evaluated from the perspective of various stakeholders. The main measures that can be associated with performance include financial and non-financial ones both which can be related to the cost of quality. Some of the financial measures as indicated by Campanella (2011) include sales volumes, profits, investments and returns. All these measures are very much dependent on the firm policy in terms of how their quality services or products are received by their customers.

In this study the performance of logistics firms will be assessed and establish if there is a relationship between the cost of quality and performance of logistics firm. Some logistics firm practice performance contracting in their execution of customer order, which is a means of getting results from individuals, teams and the organizations within a framework of planned goals, objectives and standards. It allows for the setting of targets and the development of indicators against which performance can be later measured (Wang & Yuan, 2009). The key performance indicators for measuring overall performance in the logistics firm will be based on financial and non financial indicators.

1.1.4 Logistic Firms in Kenya

The logistics industry in Kenya is well diversified and includes firms specialising in sensitive or perishable goods, for example exports of fresh fish to countries in the European Union. Most horticultural products are air-freighted. The bulk of trade in and out of Uganda is carried across Kenya from and to Mombasa, the country's main port. Managed and operated by the Kenya Ports Authority, the port is a crucial hub for

international trade in the East and Central African region. Inland transportation from the port is provided by truck and train, and special rail container services operate from the port to inland container depots.

A wide variety of shipping services operate in the port, shipping to destinations worldwide. The port is fully equipped to handle a variety of cargoes, with a rapidly developing trade in containerized cargo. It provides 16 deep-water berths totaling over three thousand meters in length with alongside depth of ten meters. It operates Inland Container Depots, dry ports for the handling and storage of containerized cargo and empty containers, alongside extensive storage facilities.

Kenya has a large number of freight forwarders and custom brokers, based primarily in Nairobi and Mombasa. Large international courier services, such as UPS and DHL, operate in the country alongside smaller, local firms. The major global consultancy firm Deloitte is in operation, alongside local firms such as Strategic Training and Logistics Consultants Limited. The Kenya International Freight and Warehousing Association is the industry body. Development and regulation of the sector is overseen by the Ministry of Transport. The World Bank's Logistics Performance Index places Kenya 122nd overall out of 155 countries, with a score of 2.43, 45.9% of the highest performer, Singapore.

1.2   Statement of the Problem

Logistics systems play a key role for many organizations both in the public and private sector. What is of great concern to all stakeholders is the actual cost of quality in the system that leads to profit margins either growing or shrinking.   It is therefore important that the real cost of quality be established in logistics firms for their effectiveness to be felt in and beyond the firm as proven in Chinese manufacturing firms (Yu & Shen, 2013). Similarly Brammer and Walker (2011) in their study of public sector performance noted

the need for clear objectives in determining the inputs and outputs of any quality system arguing that what the system receives is likely to be what it outputs. In the European Union countries, the cost of quality has been highlighted as being determined in forecasts and prior to any commencement of a process so that all inputs are correctly costed and thoroughly examined to ensure no further costs are incurred unless planned for (Bowen et al, 2012).

Studies in West Africa and East and Central Africa have indicated that the cost issue in any given system is controlled by good leadership as opposed to the many controls advocated for by specialists in logistics systems (Kwaw et al, 2012). Other research results indicate that, deriving the correct cost calls for thorough observation of both the external and internal environment as far as logistics are concerned. The argument is that costs of quality can be controlled and that every firm has different costs unique to itself (Aziz & Noor, 2013).

Kenyan scholars including Okwiri (2012) have argued that quality and cost are inseparable adding that in order to experience non-contested results in tendering processes; organization must incur some cost which in the long run results in growth of profit margins. In their review of logistics firm dealing in public sector, Munalo and Munalo (2010) observed that there were exaggerated costs associated with the quality systems and that through controls and checks, the government was able to avoid some of the losses forecast through improved cost of quality. The conclusion in their studies suggests that quality can be achieved at some cost but that the measures required to have such results are not free.

It is clear from the review that several gaps emerged. This study was thus inspired by the need to fill the gaps and have a solution on the problem of cost of quality. Some of the studies were conducted in Western countries and Asia while others took place in the

regional locations. That creates a gap since Kenya environment is different from those countries and the study applied the knowledge used in the developed world and regional areas to test the Kenyan situation specifically on performance in logistic firms in Nairobi which have become very vital in the society both in public and private spheres. The key question that guided in the study was "does cost of quality get considerable attention in performance of logistic firms in Kenya?"

1.3   Objectives of the Study

The objectives of the study were to:

i.   Establish the costs of quality in logistics firms in Nairobi County

ii.   Establish performance of logistics firms in Nairobi County

iii. Determine relationship between cost of quality and performance in logistics firms in Nairobi County

1.4   Importance of the Study

In generating value the first group of beneficiaries for this study will be investors who need to be well informed about the cost of quality while operating in logistics firms. Similarly, professional players in the field of logistics are very much concerned with the issue of quality. This group will find this study very beneficial as they will utilize the study findings to help identify measures of costs that help eliminate waste and achieve high quality standards as demanded on the modern markets by both customers and suppliers.

It is also suggested that regulatory authorities and policy makers such as the Kenya Bureau of Standards (KEBS), Quality Council and Kenya National Bureau of Statistics will find the study very relevant. Finally, the study will contribute to the body of

knowledge and field of scholars dealing with quality, costing and logistics both in corporate and private organizations. The findings, conclusions and recommendations will be used as a basis for scholars to empirically or theoretically study the topic thus enriching the field of research.

CHAPTER TWO: LITERATURE REVIEW

2.1   Introduction

This chapter explores the existing literature on the cost of quality performance of logistics firms in Nairobi. The chapter covers the empirical literature on factors that directly play a role in cost of quality and performance. Finally critical gaps are highlighted and identified.

2.2   Costs of Quality in Logistics Firms

The concept of quality costs is a means to quantify the total cost of quality-related efforts and deficiencies (Deming, 1982; Feigenbaum, 2002; Wang & Yuan, 2009).   The definition changed the general perception that higher quality requires higher costs, either by buying better materials or machines or by hiring more labor. In the modern world, while cost accounting had evolved to categorize financial transactions into revenues, expenses, and changes in shareholder equity, it had not attempted to categorize costs relevant to quality. By classifying quality-related entries from a company's general ledger, management and quality practitioners can evaluate investments in quality based on cost improvement and profit enhancement (Vaidyanathan & Devaraj, 2008).

According to some scholars, quality is always associated with cost. Therefore if production churns out high quality products, you can be sure that these products will reach consumers at a higher price than lesser quality products. It can therefore be argued that cost of quality, refers to the added cost of investment on better raw materials, better processing equipment, better trained operators and workers, better packaging materials, better storage facilities and all those better resources needed to produce the product with higher quality (Omar & Morgan, 2014).

On the other hand, a customer perceives a product as having a high level of quality if it conforms to his expectations. Thus, high quality is really just making sure that a product does what a customer expects it to do. The implication is that the customer is key in determining the quality of goods. Based on this definition, quality is not having the highest possible standards for creating the ultimate product. It does not matter how much one spends on the product or service since it will be a waste when the customer only wants it to be up to a certain standard. This is the extreme case in which a producer has just gone to considerable expense to create something that a customer does not define as being of high quality (Manalo & Manalo, 2010).

Nijaki and Worell (2012) concluded that, primarily, a logistics process ensures that the company's logistic is competitive, fair, and provides the best possible prices available in the market. Because of the efficiencies gained through a formal logistics process, logistic is an important systems component in a business's overall management structure. Some problems on a company's cash flow and balance sheet can be traced to problems with logistics, including holding supplies and inventory too long and having the terms of payables for supplies not matched to their respective receivables as well as storage and transportation of goods (Zang, 2010).

Furthermore, Nijaki and Worrel (2012) pointed out that when the supplier controls the production capacity as well as the prices, dynamic pricing is the best alternative for all parties, including the end customers. This implies that the logistics and production quantities are determined with more information, so as to retain the risks associated with demand uncertainty and ambiguity.

In studying the effect of supply chain uncertainty on the optimal order quantity, Hammami et al (2012) found that under a cost structure for both the in-house production case and outsourcing case, a less variable yield rate led to a lower optimal price and a higher expected profit. Taking both demand and supply uncertainties into consideration, the supply environment incorporated quantity and timing uncertainty, and the demand uncertainty was illustrated in terms of a quasi-concave distribution (Brandon-Jones & Carey, 2011). However, the work was conducted from the aspect of the supplier and the focus was placed on inventory control rather than logistics leaving the question of cost in quality still not resolved (Mukhopadhyay & Ma, 2009).

In summary, the fundamental principle of the cost of quality is that any cost that would not have been expended if quality were perfect is a cost of quality. These include such obvious costs as scrap and rework, but it also includes many costs that are far less obvious, such as the cost of reordering to replace defective material. Campanella (2011) concurs that customer service businesses also incur quality costs for example, a hotel incurs a quality cost when room service delivers a missing item to a guest. Specifically, quality costs are a measure of the costs specifically associated with the achievement or non-achievement of product or service quality and this includes all product or service requirements established by the company and its contracts with customers and society. Quality costs are therefore the total of the cost incurred by: investing in the prevention of non-conformances to requirements; appraising a product or service for conformance to requirements of the customer; and failure to meet requirements of the customer.

2.3   Cost of Quality and Performance of Logistics Firms

In studying the public logistics system, the conclusion is that logistics processes often represent a significant share of a country's gross domestic product. To maximize the use of scarce financial resources, governments develop procedures and mechanisms to ensure that public entities procure these collective goods and services at least cost and in a fair

and transparent manner using a trusted logistics system (Tai et al, 2010). This translates to costs which normally occur in terms of: supporting local industry; open and effective competition; risk management like in military procurement; integrity and ethics; supporting government policies and initiatives like gender or youth; managing purchasing conducted by private sector providers; and common-use contracts (Brammer & Walker, 2011).

In the public logistics, it is generally argued that public agencies can make use of their market power by procuring goods and services using a well-defined framework holistically infused with economic, environmental, and equity-driven values which accordingly does not fully make the logistics system free from incurring costs of quality (Nijaki & Worrel, 2012).

However, for most logistics in statutory organizations, the principal mechanism for minimizing cost of quality is the contract between buyer and supplier. In most cases, these contracts are awarded against foreign-aid funded projects by using the international competitive bidding process. Chang et al (2006) argued that organizational buying behaviour is a complex structure of relationships within and outside a buying center and may consist of a multi-stage decision process and, generally, a wide range of determinants are associated with this process leading to difficult judgments on how to design a full proof quality system.

It is also observed that determining the optimal logistics supplier who offers the best all-around package of product and services for the customer is extremely important in the organizational buying process (Kashiwagi, 2011). This holds true if the cost of quality is minimized to the nearest level of becoming zero implying that supplier involvement and collaboration is necessary to improve supply chain effectiveness and a firm's competitiveness through near-zero cost of quality. This proves that an effective logistics

system must be filled with quality to satisfy very many stakeholders and cut down on the cost of quality through such proven systems as 6-Sigma and continuous improvement (Omar & Morgan, 2014).

2.4   Summary and Conceptual Framework

This section reviewed literature from various scholars based on the key objectives of the study.   It also summarizes the study gaps from various findings to come up with a workable conceptual framework that will be a guide to the filed study in logistics firms in Kenya.

2.4.1   Summary and Gaps

Cost of quality is a key area that scholars have debated over long periods. The studies conducted in the Western countries, Asia and the Latin Americas have shown that procedures alone cannot eliminate costs. At the same time, it is established that public logistics systems operate differently from the private ones leading to a differentiation in terms of how costs are met to increase quality. The clear emerging trend is that a compromise needs to be struck to find a balance between what costs can be eliminated while retaining integrity in the public as well as private logistics systems. What works in the public sector might not work in private sector and hence there was a gap that required a field study to establish the true position. The question in the field for this study was, "how does the cost of quality affect performance in logistic firms in Kenya?"

2.4.2   Conceptual Framework

Conceptual framework (Mugenda & Mugenda, 2003) is defined as a set of broad ideas and principles taken from relevant fields of enquiry and used to structure a subsequent presentation. It is a hypothesized model identifying the module under study and the

relationship between the dependent and independent variables. Such a framework is intended as a starting point of reflection about the research and its context. When the conceptual frame work is clearly articulated, it has potential usefulness as a tool to support research and therefore to assist the researcher to make meaning of subsequent findings. The dependent variable in this study is performance of logistics firm while the independent variable is the cost of quality and quality factors that act as a guideline in operations. If cost of quality is well eliminated through proper logistics processes, then we could expect to have quality and improvement in effective firm performance.

In the diagram, the independent variable is cost of quality which has to be influenced by re-workings, re-calls, re-tests and re-builds. These factors combine to affect the performance of firms which is the dependent variable. The dependent variable is measurable through sales volumes.

Figure 2.1: Conceptual Framework

Cost of Quality		**Performance of Logistics Firms in Nairobi**
- Re-workings	→	**-** Sales volumes
- Recalls		
- Retests		
- Rebuilds/Corrections		

Independent Variable   **Dependent Variable**
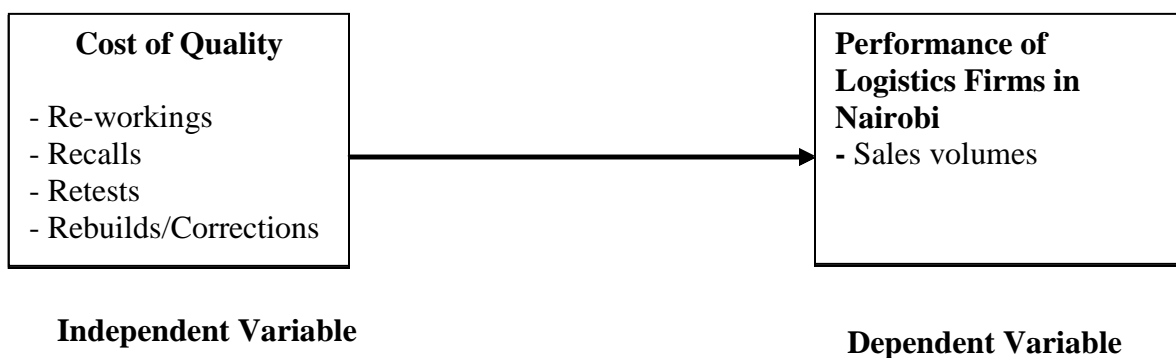
Source: Survey Data (2015)

CHAPTER THREE: RESEARCH METHODOLOGY

3.1   Introduction

Methodology refers to the choices that we make about cases we want to study, methods of data gathering and other forms of data analysis (Mugenda & Mugenda, 2003). This links the methodology to rules followed in a carrying out inquiry. In this chapter, the researcher discusses the procedure used in conducting the study. These include the research design, population, sampling, data collection and data analysis procedures.

3.2   Research Design

This study adopted a descriptive survey research design because it relies heavily on quantitative data collected from the range of respondents involved in this study. The research design involves observing and describing the behaviour of a subject without influencing it in any way (Kothari, 2004). Descriptive survey is concerned with current or past status of phenomena and allows for making of preliminary identification of outcomes. The design also allows for the description of causal relationships between variables under study (Cooper & Schindler, 2009).

3.3   Population

Cooper and Schindler (2009) have defined target population as a group of individual's objects or items from which samples are taken for measurements. The target population for the study comprised 45 logistics firms in Nairobi and which had been in operation for more than 10 years.

3.4   Sampling

The study used a census to select the 45 logistics firms that are located within Nairobi County and have operated for at least 10 years.   The firms involved were located in the

capital City of Nairobi for ease of accessibility. This is due to logistical challenge of the researcher accessing far off locations like Mombasa and border towns where some of the logistic firms are to be found.

3.5   Data Collection

The primary data for analyses was obtained in both qualitative and quantitative mode. The reason for use of primary data was to enable full insight in to the cost of quality in logistics firms.   The instrument applied was a structured questionnaire that was administered through drop and pick system. Some of the respondents did not have adequate time and had to be left with the questionnaires for collection on various dates whereas others were emailed to the field team.

3.6   Data Analysis

Data from the questionnaires was analyzed using 5-point Likert scale questionnaire responses. Descriptive analysis involved getting the tables with frequencies and percentages followed by mean and standard deviation. Those questions with qualitative responses were analysed through content analysis. The mean and standard deviation for cost of quality was derived followed by performance through sales volume. To test the relationship between dependent and independent variables, the following linear model was used through Analysis of Variance (ANOVA);

$Y = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \alpha_3 X_3 + \alpha_4 X_4 + e$

where:

Y= Logistics Firm Performance; X_1 = Re-works; X_2 = Re-calls; X_3 = Re-tests;

X_4 = Re-builds; α_0 = constant; e = Error term or noise

CHAPTER FOUR: DATA ANALYSIS, FINDINGS AND DISCUSSION

4.1   Introduction

The main objective of the study was to determine the relationship between cost of quality and performance of logistics firms in Nairobi. The study focused on logistics firms within Nairobi County, where most of the logistics firms have their operations or headquarters offices. Staff in strategic positions at the logistics firms was involved in the exercise including supplies department, operations management, transport sections and finance as well as ICT. Sales reports were used as permitted by the firms.

4.2   Response Rate

The study focused on the staff of logistics firms in Nairobi county with an initial target of 45. A total of 32 firms responded indicating a response rate of 71 percent as shown in Table 4.1. This response rate is in line with recommendations from field scholars including Kothari (2004) and Sekaran (2009) who observed that a response rate of at 50 percent is good representative of an open research without any sensitive data. This research was such type requiring no sensitive data and the response rate was adequate for carrying out analysis in the next sections.

Table 4.1: Response Rate

Logistics Firms	Expected	Actual	Percentage
Response	45	32	71
No Response	0	13	29
Total	45	45	100

4.3   Cost of Quality

This section focuses on the cost of quality data from the field. The measure in this section used a 5-point Likert scale to get opinion of the respondents with 1 representing

extreme rejection and 5 representing extreme acceptance of the cost of quality measurement.

4.3.1 Reworking Costs

The reworking costs are estimated using factors that help to eliminate cost of quality in a firm which include clear guidelines, conformity to international standards, re-workings by all sections, marking of re-worked products, use of high technology platform and special reworking rooms. From the results in Table 4.2, the highest mean is 4.47 for all sectors having reworking rooms with a standard deviation of 0.507 which is acceptable and indicates fair dispersion. The average maximum was 4.83 and a mean of 3.48 indicating that re-workings are well embraced by the logistics firms.

Table 4.2: Descriptive Statistics for Re-workings

Re-working Measures	Min	Max	Mean	Std. Dev
- Clear reworking guidelines	1	5	3.13	1.040
- Reworking conformity to international standards	2	5	3.50	.762
- Re-workings by all sections of the firm	1	5	3.31	1.091
- Reworking with high technology platform	2	5	3.78	.832
- All sectors with re-workings room	4	5	4.47	.507
- Re-working average	1.83	4.83	3.48	0.822
Valid N (listwise) = 32				

4.3.2 Recalls Costs

In terms of recall costs, the study results as represented in Table 4.3 indicate that the highest mean is 3.28 with a standard deviation of 0.085 for training programmes of recall procedures. This implies that the logistics firms have adequately embraced the training of staff in handling recall procedures. On the contrary, the lowest mean is 2.72 with a standard deviation of 0.729 for recall linkages. This has the implication that firms have

not developed effective programmes for linkages in recalling products definitely increasing the cost of quality in their performance. In overall terms, the mean is 2.98 with a standard deviation of 0.559 indicating that the recall measures are not that popular with the logistics firms.

Table 4.3: Descriptive Statistics for Recall costs

Re-call measures	Min	Max	Mean	Std. Deviation
- Employment of qualified recall staff	1	5	3.00	.078
- Training programme for recall procedures	1	5	3.28	.085
- Policy for recall of products	2	5	2.84	.954
- Recall linkages that help in products recall	1	4	2.72	.729
- All staff incorporated in product recalls	1	5	3.06	.948
- Re-call averages	1.2	4.8	2.98	0.559
Valid N (listwise) = 32				

4.3.3 Re-Testing Costs

The results for re-testing costs as presented in Table 4.4 indicate that the highest mean is 3.81 with a standard deviation of 0.738 for re-test monitoring system implying that most of the logistics firms have in place, a monitoring system thus reducing greatly the chance of re-testing cost. However, the lowest mean is below the threshold of 2.5 at 2.41 with standard deviation 0.798 for special teams used in re-testing. This then implies that lack of re-testing teams causes increase in the cost of quality for logistics firms. The average mean for re-testing was 2.96 with a standard deviation of 0.607 indicating that the logistics firms firmly adopted the re-testing measures.

Table 4.4: Descriptive Statistics for Re-testing

Re-testing measures	Min	Max	Mean	Std. Deviation
- There is a re-testing room	1	5	3.13	.129
- Customers are charged for retesting	1	4	2.50	.762
- Special team for re-testing	1	4	2.41	.798
- A monitoring system for product re-tests	2	5	3.81	.738
- Re-testing averages	1.25	4.5	2.96	0.607
Valid N (listwise) = 32				

4.3.4 Re-building Costs

This section deals with re-building costs and results as highlighted in Table 4.5 indicate that the highest mean was 2.97 with a standard deviation of 0.897 indicating that customers are charged for re-building costs. However due to the mean being close to the threshold of 2.5, there is likelihood that most respondents were not sure of the charge. On the other hand, involvement of partners in product rebuilding had the least mean of 2.44 with a standard deviation of 0.669. This mean is also very close to the threshold of 2.5 suggesting that respondents were not so sure of involvement of partners in the re-building process, which is an increase in the cost of quality as no partners are involved. The average mean for re-building measures was 2.79 with a standard deviation of 0.766 which is also an indication that the re-building measures are not yet fully embraced by the logistics firms.

Table 4.5: Descriptive Statistics for Re-building costs

Re-building measures	Min	Max	Mean	Std. Deviation
- There is a department for rebuilding products	1	4	2.81	.780
- Customers are charged for rebuilding products	1	5	2.97	.897
- Partners are involved in product rebuilding plans	1	4	2.44	.669
- Firm policy on rebuilding and cost effectiveness	1	4	2.94	.716
- Re-building Averages	1	4.25	2.79	0.766
Valid N (listwise) = 32				

4.4   Performance in Logistics Firms

The firm performance was estimated using sales volume from the last three years prior to 2015 and the firms had to be in service for 10 or more years. The results in Table 4.6 indicate a mean of 511886 with a skewness statistic of -0.149 which is less than zero indicates that most of the firms had a left skew and that most firms had more than average returns with just a few to the extreme left of the distribution mean. This is an indication that logistics firm performance was quite positive.   The high standard deviation is due to the many small logistics firms which are still considerably new on the market and can as much as deal with only 2 containers in a long period indicating very low volume figures as compared to the mean of the sample.

Table 4.6: Descriptive Statistics for Sales Volumes

Performance measure	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
Average Sales volume in the last 3 years	32	118472	875023	511886.31	246401.998	-.149	.414
Valid N (listwise)	32						

4.5   Relationship Between Cost of Quality and Performance

The objective in this section was to establish the relationship between performance and cost of quality. This was accomplished using regression analysis as discussed. The independent variables or predictors included re-workings, recalls, re-tests and rebuilds while the dependent variable was firm performance. From the results in Table 4.7 it is shown that 17.2% of the variation in performance of logistics firms can be explained by the predictor variables Re-works, Re-calls, Re-tests and Rebuilds with $R^2 = .172$, adjusted $R^2 = .083$.

Table 4.7: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.415(a)	.172	.083	.730

a Predictors: (Constant), Re-works, Re-calls, Re-tests, Rebuilds

The analysis of variance (ANOVA) in Table 4.8 indicated that the model is significant in explaining the variance in the cost of quality in the performance of logistics firms in Kenya with p=0.017 (p<0.05). Similarly the F-statistic is large enough indicating that the variables affect the performance positively.

Table 4.8: ANOVA(b)

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	3.093	3	1.031	1.936	.017(a)
	Residual	14.907	28	.532		
	Total	18.000	31			

a Predictors: (Constant), Re-works, Re-calls, Re-tests, Rebuilds

b Dependent Variable: Performance

The analysis of coefficients in Table 4.9 indicate that the constant term is a positive 4.606 with a standard error of 0.901 while the t-statistic of 5.113 is large enough with a significance of p=007 (p<0.05). Two variables have shown a positive influence on performance and they include re-tests and re-builds with coefficients of 0.107 and 0.322. However, reworks and recall coefficients are negatively affecting the performance of the logistic firms as they have negative coefficients of -0.175 and -0.246 respectively. Since all the variables have a significant p value, they are included in the model which was a linear equation.

Table 4.9: Coefficients (a)

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta	B	Std. Error
1 (Constant)	4.606	.901		5.113	.007
Re-works	-.175	.158	-.191	-1.108	.003
Re-calls	-.246	.123	-.348	-2.005	.055
Re-tests	.107	.181	.103	.592	.021
Re-builds	.322	.202	.411	.592	.031

a Dependent Variable: Performance

Table 4.9 indicates the regression model is follows:

Performance $= 4.606 + 0.107X_1 + 0.322X_2 - 0.175X_3 - 0.246X_4$

This implies that for every unit of firm performance, there is a favourable 0.107 positive effect of re-testing and 0.322 of re-building while at the same time the performance is pegged down by 0.175 cost units of re-workings and 0.246 cost units of re-callings

4.6   Discussion of Findings

The study aimed at establishing the relationship between the cost of quality and performance at logistics firms in Kenya. From the descriptive results indicating that the various factors affected performance, the results are in line with what other scholars have observed. It is also observed that logistics firms have always tried to bring down the high costs of their operations through control of the costs of quality specifically singling out recalls as a key cost that affects the quality of their performance and can damage the reputation of a firm in the industry. Similarly, the study has pointed out that heavy recalls in some firms is a key factor in the slow performance of the sector. The study also noted that one of the most important considerations for logistics firms was to have recall partnerships that could help in reducing the final cost and hence raise the quality of goods send back to the market.

From the study, costs of quality can be stemmed or greatly reduced through effective re-testing that should not be prompted by customers but through a monitoring system and a training program for special teams in a firm that have full time duties to handle re-testing programs. All the factors of cost of quality including rebuilding, retest, recalls and reworks should be inculcated into the operations strategic plan of the firm with a high level of implementation.

The study data indicate that costs of production if well handled would lead to increased quality which in turn would lead to increased performance. This has the implication that if firms take good care of the costs of quality to bring them as down as possible, there is a high likelihood that the firm performance will go up. It can therefore be said that the most well performing logistics firms had strong links with partners on various markets who helped bring down the total cost of recalls and retests. Such partners with international reputations help restore confidence in consumers especially after a recall case has taken place.

CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS

5.1   Introduction

Chapter five gives a summary of the entire research highlighting the conclusions, recommendations and suggestions for further research.   The recommendations and suggestions are based on the findings in the previous chapters and the main study objective of establishing a relationship between the cost of quality and performance of logistics firms in Kenya.

5.2   Conclusion

In the first objective concerning cost of quality, it was established that the re-testing and re-building operations were positive to the total cost of quality in the logistics form as they had a positive effect on the performance of the logistics firms. Logistics firms have embraced the various factors that affect the cost of quality but to various degrees, which implies that with good implementation through training, the cost of quality can be brought to a very low level.

In the second objective to establish the performance of logistics firms it was concluded that both the old and new firms in the industry could have high sales volumes or low sales volumes depending on many factors which individual firms could not reveal. The performance of the logistics firms over the last three years between 2012 and 2014 appeared to have good cost management.

In the third objective on relationship between cost of quality and performance it was established that good management of rebuilds and retests had a positive impact on performance while the two operations of re-workings and re-calls had a very detrimental

effect on the performance of the firm as they caused a drop in performance of the logistics firms. This also implies that the performance of firms can be well operationalized if the costs of quality are controlled.

5.3   Recommendations

The study findings have led to recommendations concerning logistics firms. Specifically, there is a rising need to have the firms getting into positive partnerships that would enable them reduce recalls from the market. This would be very appropriate if the firms have both local and international partners. It was also recommended that the training of special teams and having departments for recalls, re-tests, re-workings and re-buildings should be embraced as this reduced the costs and increased the likelihood of better performance. Quality platforms from the government side including Kenya Bureau of Standards (KEBS) and the International Standards Organization (ISO) should be incorporated in the operations of the logistics firms. Other organizations like National Environmental Management Authority (NEMA) should also be consulted on the best measures for observing quality.

5.4   Limitations of the Study

One specific limitation was that firms in the industry and the market in general are not very open to discussions concerning their costs and performance in general and specifically issuing of figures. However, this was to some extent overcome through the use of open approach and assurance to the responding firms that the study was purely academic and that their contributions would remain confidential without breaking any code of secrecy or divulging the information collected from the field to any unauthorized party. This in effect proved that the study was being carried out in a professionally ethical manner enabling the high response rate that was witnessed in the time pressure of field study.

5.5   Areas of Further Research

There is need to have a further study in the logistics sector and specifically the area of quality. As found from the study analysis, other scholars could focus on the effect of training on quality teams of logistics firms. Another area of recommended study is the use of multiple factors instead of using only the cost of quality to make recommendations on the performance of logistics firms in Kenya.

It is also possible to carry out further studies on logistics forms based on the type of services they perform. This would mean having to look at specific cost of quality measures in a more focused sense. At the same time, the period of those firms in operation could also be used as a factor in assessing the cost of quality relationship to performance. Having carried out the study in Nairobi, it is also recommended that the same could be carried out in Mombasa and Malaba town on the Kenya-Uganda border. The two towns host a large number of branches or headquarters for logistics firms. Finally, there is need to have further studies on the factors that influence cost in determining firm linkages in logistics industry in Kenya.

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APPENDICES

Appendix I: Questionnaire

Dear Respondent,

This is to welcome you to this academic research and wish to ascertain that the purpose of this research is to conform to academic requirements. Your confidentiality is guaranteed and on request, the results of this study can be availed to your given address.

Section A: General Firm Demographics

1. Main services of logistics firm……………………………………………………….

2. Number of branches………………………………………………………….………

3. When was the firm started? ....

4. Indicate any international partners in Logistics (e.g. DHL, UPS, etc)?
....

Instructions: In sections B, C and D, fill in using a tick (√) to indicate your objective opinion on each of the quality aspects highlighted.

Section B: Re-workings

Re-Working Guidelines	Very small extent	Small extent	Moderate extent	Great extent	Very great extent
5. There are clear guidelines on product re-working					
6. Processes conform to clear international standards of re-working?					
7. All sections of the firm can re-work a problem					
8. The firm marks out any re-worked products					
9. The firm has technology platform					
10. All sectors have room for process re-working					

SECTION C: Product Recalls

Recall Measures	Very small extent	Small extent	Moderate extent	Great extent	Very great extent
11. The firm has employed qualified staff in critical sectors					
12. The firm has a training programme for its officers in professional studies					
13. The firm has a policy of recalling products					
14. The firm has linkages with forms that help in product recalls					
15. The firm incorporates all staff in product recalls					

Section D: Re-tests

	Re-test Statement	Strongly Dis-Agree	Disagree	Neutral	Agree	Strongly Agree
16	The firm make room to re-testing					
18	Your customers are charged for retests					
19	There is a special team for guidance on all re-tests					
20	There is a monitoring system for re-testing					

Section E: Rebuilds/Corrections

	Re-build Statement	Strongly Dis-Agree	Disagree	Neutral	Agree	Strongly Agree
21	Specific department on rebuilds					
22	Customers are charged for full rebuilding of plans					
23	Partners ships involved					
24	Firm policy on re-builds and corrections to minimize costs					

Section E: Firm Performance – (Please just give average ranges to help improve confidentiality**)**

In this section we seek information on your firm's performance during the last three years (2011-2014)

21   What is the annual net sales volume in the last 3 financial years as indicated in the schedule below

	2011-2012	2012-2013	2013-2014	Average
Sales Volumes				

Thank you for participating in the research

Appendix II: University Research Authorization Letter

UNIVERSITY OF NAIROBI
SCHOOL OF BUSINESS
MBA PROGRAMME

Telephone: 020-2059162
Telegrams: "Varsity", Nairobi
Telex: 22095 Varsity

P.O. Box 30197
Nairobi, Kenya

DATE 15TH OCT 2015

TO WHOM IT MAY CONCERN

The bearer of this letter ... MAIYO MARION JEMELI

Registration No... DGI 70868 2014

is a bona fide continuing student in the Master of Business Administration (MBA) degree program in this University.

He/she is required to submit as part of his/her coursework assessment a research project report on a management problem. We would like the students to do their projects on real problems affecting firms in Kenya. We would, therefore, appreciate your assistance to enable him/her collect data in your organization.

The results of the report will be used solely for academic purposes and a copy of the same will be availed to the interviewed organizations on request.

Thank you.

15 OCT 2015
UNIVERSITY OF NAIROBI
SCHOOL OF BUSINESS
P.O. Box 30197 – 00100, NAIROBI

PATRICK NYABUTO
MBA ADMINISTRATOR
SCHOOL OF BUSINESS

Appendix III: Logistics Firms

Table 1: Sample of Verified Logistics Firms in Nairobi County, Kenya

S/No.	Logistic Firms		
1	Hellmann Perishable Logistics	23	Mitchell Cotts Kenya Ltd
2	Bollore Africa Logistics	24	Signon Freight Ltd
3	Cargo Elegance logistics	25	Urgent Cargo Handling
4	Empire Logistics Services	26	Crystal Freight connections
5	Roy Transmotors Ltd	27	Four Seas International
6	Kuehne + Nagel Kenya Ltd	28	Panal Freighters Ltd
7	Kenfreight E.A. Ltd	29	Bahari logistics
8	Hellman perishable logistics	30	Dean logistics ltd
9	Destiny cargo forwarders	31	Transnet freight services
10	Jarg trade logistics	32	Capital cargo freight
11	Spedag logistics	33	Aero cargo express ltd
12	Schenker Ltd	34	Cipro logistics
13	AIM Ltd	35	Focus initiative Imports
14	Citimax technologies ltd	36	Global cargo handlers
15	Danafrica logistics	37	Rapid Kate Logistics
16	Stepping stone transporters	38	Swiftlink freight services
17	Four seas international	39	Freightwell express
18	Soolo international	40	First cargo freight handlers
19	Victoria logistics ltd	41	Projected cargo services
20	Trade winds logistics	42	Airband cargo forwarders
21	Eaton cargo links	43	Swissport cargo services
22	Nzoia freight ltd	44	Excellent logistics
		45	Export consolidated services

Source: Republic of Kenya Economic Survey, 2013

Appendix IV: Logistics Firms Average Data

Data for statistical analysis

Firm	Reworks	Recalls	Retests	Rebuilds	Sales_3yrs
Hellmann Perishable Logistics	3.2	2	3	2.75	875023
Bollore Africa Logistics	3.3	2.8	3.25	2.75	810015
Cargo Elegance logistics	3.7	2.6	2.5	3	221812
Empire Logistics Services	3.0	3	3.25	3	473290
Roy Transmotors Ltd	3.7	2.8	3	2.5	621647
Kuehne + Nagel Kenya Ltd	3.8	3	3.25	2.25	345729
Kenfreight E.A. Ltd	4.3	2.6	3	2	456237
Mitchell Cotts Kenya Ltd	3.3	2.6	2.75	2.25	824573
Signon Freight Ltd	3.5	3.6	3	3	118472
Urgent Cargo Handling	2.8	3.4	3.5	3	873120
Crystal Freight connections	3.2	4	3.25	2.5	634902
Four Seas International	3.0	3.6	3.25	2.75	723492
Panal Freighters Ltd	4.0	2.8	3.5	2.5	234525
Bahari logistics	3.8	3.2	3.5	3	462834
Dean logistics ltd	4.2	3	3.5	2.5	347249
Transnet freight services	3.2	3.8	2.5	2.5	732456
Capital cargo freight	3.2	3.6	3.25	2.75	627458
Aero cargo express ltd	3.0	3.2	3	3.5	712356
Cipro logistics	3.2	3	3	3	645234
Focus initiative Imports	3.3	2.6	2.75	2.5	298236
Global cargo handlers	4.0	2	2.5	3	128363
Rapid Kate Logistics	4.0	2.8	2.75	2.75	463298
Swiftlink freight services	3.8	2.2	3	2.5	118573
Freightwell express	3.5	3.2	2.5	2.75	209475
First cargo freight handlers	3.3	3.2	3	3.75	230957
Projected cargo services	3.2	3.4	3.75	3.5	837462
Airband cargo forwarders	3.2	3.2	3	3.25	746292
Soolo international	3.5	3.2	2.75	3	643821
Victoria logistics ltd	3.3	2.4	2.75	3	543823
Trade winds logistics	3.2	2.6	2.5	2.75	213482

Eaton cargo links	3.5	3	2.25	2.75	432174
Citimax Technologies	4.0	3	2	2.25	773982