FACTORS INFLUENCING SUPPLY OF PETROLEUM PRODUCTS IN KENYA: A CASE OF KENYA PIPELINE COMPANY ELDORET DEPOT, UASIN GISHU COUNTY, KENYA

PETER GICHARU NDEGWA

A research project submitted in partial fulfillment of the requirement for the award of the degree of Master of Arts in Project Planning and Management of the University of Nairobi

2017

DECLARATION

I declare that this research project is my original work and that it has not been presented in any university for academic credit.

Signed: …… Date: ……

Peter Gicharu

Reg No: L50/85257/2016

This research proposal has been submitted for examination with my approval as the University supervisor.

Signed: …… Date: ……

Mr Yona Sakaja
Lecturer
University of Nairobi
Department of Open and Distance Learning

Signed: …… Date: ……

Dr. Joash Migosi
Lecturer
University of Nairobi
Department of Open and Distance Learning

DEDICATION

I dedicate this work to my family, wife Anna Nyambura, son Rejoice Amani,

ACKNOWLEDGEMENT

My thanks also go to my supervisor, Mr. Yona Sakaja and Dr Migosi for their consistent guidance in helping me carry out quality research, my family with their endless support. I would like to also appreciate the moral support given by my classmates who constantly kept in touch with phone calls, updating and encouraging me all the time. This research work would not have been complete without the invaluable assistance that I received from various people. I would like to thank God who has been with me and energized me during the challenging academic journey as without his love and strength, achieving knowledge would be in vain and would not have made it to this point. Lastly, I sincerely thank my family members for their morally, spiritually and financial support; your love, encouragement, guidance, and understanding will not go unnoticed. Isaiah Njoroge, Stephen Kantai, Paul Kariba for great support and encouragement.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS AND ACRONYMS

ERC-Energy Regulation Commission

IT-Information Technology

ICT- Information Communication Technology

IOCs-International Oil Companies

KOSF-Kipevu Oil Storage Facility

KPC-Kenya Pipeline Company

KPRL-Kenya Petroleum Refineries Limited

NOCK-National Oil Corporation of Kenya

OPEC-Organization Petroleum Exporting Countries

OMC-Oil Marketing Companies

OTS-Open Tender System

SCM-Supply Chain Management

NACOSTI-National Commission for Science, Technology, and Innovation

NPA – National Petroleum Association

ABSTRACT

Petroleum products are typically in high demand in most economies around the globe with countries such as South Sudan, Congo, Rwanda, and Uganda rely on Kenya for petroleum products. Management of petroleum products has diverse effects on the supply chain. The research sort to establish the influence of storage capacity on the supply of petroleum; determine the influence of pipeline infrastructure on the supply of petroleum; establish the influence of regulations on the supply of petroleum products by Kenya Pipeline Company and to determine the role of quality control in the supply of petroleum products by Kenya Pipeline Company. The study used descriptive statistics to analyze obtained data. The study had a target population of 98 respondents which resulted in a sample size of 91 respondents by use of Yamane (1967). Data was collected by use of questionnaires which were tested and found reliable. Collected data was analyzed by use of SPSS and results presented inform of tables, frequencies, and percentages. From the findings of the study, storage capacity was found to be an issue that affected the supply of different petroleum products resulting to low throughput and increased lead time, infrastructure at the depot was found to be inadequate in meeting the supply-demand of different petroleum products needed by consumers. Regulations adopted by KPC Eldoret depot meet the consumer requirements and set standards but due to lack of enforcement have led to low standards in petroleum products handling. The quality of petroleum products availed at the depot meets the set quality standards but due to ignorance, quality at times is compromised leading to adulterated petroleum products being availed to consumers. The study concluded that, with increased storage capacity, lead time will be reduced hence increasing throughput, with an improved pipeline infrastructure, efficiency and effectiveness will be addressed leading to increased throughput and turnaround time, regulations adopted by KPC Eldoret depot were found to be effective which enhanced management of petroleum products but more enforcement was important. The researcher recommends that storage and loading capacity to be increased, reduce beauracratic structures in truck clearance and improvement on quality control measures to ensure quality products are supplied to consumers thus ensuring proper supply of petroleum products

CHAPTER ONE
INTRODUCTION

1.1 Background of the Study

The sector of gas and oil remain one of the largest industries not only in the country but also across the globe because of the functions the industry serves such as the provision of electricity, chemicals, heating, petroleum products, lubricants, and transportation. Morton (2003) observes that liberalization of markets and ease of international trade has translated to increased demand for petroleum products to an extent that the supply chain of the sector faces a wide array of challenges due to its complexity.

Irrespective of the essentials of petroleum supply chains, most firms dealing in oil and gas continue to face the drawback of efficiently managing the day-to-day supply chains. Due to the unpredictable sustainability of oil supply, most companies dealing in petrochemicals and oil are constrained to formulate policies of ensuring higher safety standards with objectives of looking for other sources of supplies as pointed by Ikram (2004). More often than not, most oil supply chains are inflexible, which translates to long transportation period, prolonged lead-times, and transportation difficulties, which are difficult to substitute. It is imperative to point out that petroleum products require unique transportation facilities as an approach to ensuring the safety of the users and products and the transportation facilities include but not limited to railroads and tankers.

Across the globe, the oil industry has one of the most complex supply chains, as it encompasses a wide array of activities that include handling of materials, technological application, global transportation, and exploration among other activities. The oil industry provides a sophisticated framework when it comes to the implementation of the SCM approaches. In this respect, supply chains ought to satisfy the consumers of the supplied products and this requires that supply chains ought to supply the right products to the appropriate market at the right and still register profits.

In the contemporary business world, there exists a wide array of approaches to ensuring that supply chains in the oil industry are resilient even though the sector poses complex challenges. According to Chima (2007), the development of the sustainable supply chains in the oil industry has been enhanced with the advancement in information and communication technology that has enabled the integration of supply chains with other operation with a view of ensuring that management decisions guide the day-to-day operations of these supply chains. Because of environmental uncertainties facing the oil industry, companies ought to formulate sound approaches that will promote higher flexibility and reliability during production, planning, and controlling of the supply chains. To this end, it is significant to point out that the reduction in terms of uncertainties would ensure that companies are able to realize the root causes in the supply chains and as such formulate approaches to mitigate against the effects (Chima, 2007).

Supply chains in the oil industries are regarded complete when finished petroleum products are effectively transported from their point of refinery to the final consumers in gas stations or to whole sellers. The transportation of petroleum products can be in terms of tankers, pipeline among other mechanisms. The transportation of finished oil products is relatively low compared to crude oil, as petroleum can be transported between 10 to 50,000 tons while crude oil can be transported over 100,000. To this end, therefore, the transportation of finished oil products does not enjoy the economies of scale.

Most oil refinery companies target large-scale consumers who use the products in heavy heating such as power plants or they target smaller consumers through franchised gas stations. However, there remain concerns that oil may be depleted naturally because of continued exploration, yet others point out that the exploration of the products will not precipitate its depletion; rather, the fears emanate from the inability of the present supply to meet market demand. Bowersor *et al*. (2010) suggests that the principal drawback affecting oil industry is not limited to the availability of the resource, rather the challenges premises on the ability refining the product and delivering it to the final consumers at a minimum cost and, therefore, the necessity to design sound supply chain programs with an objective of realizing the aforementioned goal.

The modes of transport available for transporting petroleum product from Mombasa to hinterland include Road, Railway, and Pipeline. Pipeline mode remains the mode of choice transporting more than 90% due to its ability to transport in bulk, low handling cost, provide storage and ensure the quality of the various grades at various depots across the country for the marketer's convenience. This places the challenge of proper capacity management on the company. Due to its strategic role in oil transportation, the 800km oil pipeline is the backbone of the petroleum supply in eastern and central Africa. The pipeline feeds the depots in Nairobi the capital of Kenya, Nakuru, Eldoret and the lakeside city, Kisumu. Final products of petroleum are transferred directly from the terminal in Nairobi to the oil depots of the marketers for truck loading and subsequent delivery to marketers fuelling stations. In the western Kenya depots, truck loading is done within the pipeline company owned common user truck loading gantries.

Imported products are received into the common user government owned Kipevu Oil Storage Facility (KOSF) or private marketer's storage depots at Shimanzi. Shimanzi Oil Jetty handles Product for both local and transit, through loading into trucks and wagons at marketers depots. The product imported through the pipeline is temporarily stored at KOSF depot before pumping into mainline. Sanga (2008) notes that the line connecting Shimanzi and Kipevu depots, commissioned in March 2008 will enhance product movement flexibility in supply and storage. As a way of solving the problem of shortage of strategic stocks in the country, Energy Ministry published the petroleum stock regulations 2008 in Legal Notice No. 43 that described the strategic national stocks as comprising petrol, kerosene, diesel, and LPG (Senelwa, 2008). The strategic stock shall be acquired by National Oil Corporation of Kenya and kept by Kenya Pipeline Company. Its core business is the transportation, storage, and supply of refined petroleum products. The business process is characterized by low contact but technology-intensive processes. The main service contacts with customers in the petroleum industry include petroleum imports and receipts at Kipevu storage facility, storage depots, truck loading & pump over's and stock inventory. Supply function of Kenya Pipeline Company is defined in terms of the ability to deliver right volumes, right time and right quality at the right location (Kelemen, 1997). It is in light of the above that the study endeavors to examine the factors influencing supply of petroleum products in Kenya with specific reference to Kenya Pipeline Company, Eldoret depot.

One of Kenya's major sources of energy is petroleum and through the years, as pointed out by Wanjiku (2011), the product makes up 80% of the commercial energy that Kenya requires. In reference to the vision 2030, electricity and petroleum remains one of the most essential components protracted to change the economy. The market demand in Kenya stands at 2.5 million in every year and most of the petroleum products or crude come from the Gulf region before being refined at different processing plants in Kenya such as the Kenya Petroleum Refineries Limited. The oil market liberalization took place in the year 1994 and this required government participation as an approach to ensuring there was a clear private sector participation. At the time, there were seven companies involved in supply, marketing, procuring, and importing of oil. To this end, 30% of the total demanded crude oil was to be supplied by the National Oil Corporation of Kenya.

The Energy Act, 2006 defines petroleum as products such as natural gas, coal, peat, schist, petroleum crude, and or any other product that include gas or liquid extracted from crude petroleum. On the other hand, petroleum products refer to products such as automotive diesel, kerosene, super and regular petrol. According to Mailu (2009), the East and Central African countries are net importers of Petroleum Products, that is, refined products of petroleum and crude oil processed at the Kenya Petroleum Refinery Ltd. The inlets of East and Central African countries petroleum products are the port of Mombasa, Kenya into the region through the Northern Transport Corridor and the port of Dar es Salaam, which is the capital of Tanzania into the region through the Central Corridor. The major concern for Kenya has been the security of supply of petroleum products, fuel prices and capacity of transportation and supply infrastructure to meet the ever-escalating demand.

The supply and transportation of Kenya's petroleum products are by a means of railway, roads, pipeline and lake transport systems that form the Northern Corridor – Mombasa to Nairobi through Eldoret and Kisumu to Uganda, Southern Sudan Eastern DRC, Burundi, Rwanda, and Northern Tanzania. This petroleum supply logistics is expected to change due to the discovery of oil in Uganda and plans by Uganda to construct an inland refinery. Indications are that Uganda will be able to refine about 100,000 barrels of oil per day which will meet Ugandan market demand, with surplus for export to Kenya and other countries in the region (Mailu, 2009).

The Ministry of Energy conducts an open tender before sanctioning any imports and this required that all interests and licensed suppliers ought to be part of the crude oil refining as provided by the law. Against this backdrop, the Kenya Processing and Refinery Limited process approximately 1.6 M of tons of crude in every year and this account for about half of the petroleum demanded in Kenya. According to the Energy Regulatory Commission (2008), the ministry of energy has the responsibility of conducting an extra tender system to sanction the importation of refined products, which account for 35% of importation, whereby all the licensed firms dealing in crude have a right to participate. It is essential to point out that licensed firms can import 15%, which is the balance without considering the tender requirements.

The Kenya Pipeline Company (KPC) is a public company and its history dates back to 1973 when it was established under the companies act at the time. The company started commercial activities in the year 1978 and the company is fully owned as spelt out under the state corporate act. Accordingly, the day-to-day activities of the company are controlled and managed as per the state corporate legislations and other regulations such as Public Procurement Regulations and finance act. The principal that precipitated the Kenyan government to establish KPC was the need to provide an effective and reliable approach to transporting petroleum, either refined or crude, to hinterland from the coastal city of Mombasa. For the government to realize this outcome it put in place infrastructural developments such as the construction of a pipeline and storage centers with a view of distributing the product. One of the functions of KPC is the construction of pipelines with an objective of managing the pipeline network as the example of Mombasa to Nairobi. Further, the company (KPC) was mandated to market, deal, and process petroleum products and through this approach be able to provide distributive and transport facilities and as such be able to meet the ever-increasing demand for petroleum products. To realize this goal, KPC was able to build an extra pipeline to Eldoret from Nairobi in the year 2011.

1.2 Statement of the problem

Petroleum products are typically in high demand in most economies around the globe. The supply chain of the commodities is characterized by transportation of crude oil from where it is extracted to refineries by ship or pipeline. At the refineries, processing takes place and this is a form of value addition that brings out various products. Transportation of the final products is

also done to facilities that are closer to the final markets. Transportation requires a high degree of coordination of procurement and transport logistics to ensure that right volumes, prices and supply reliability are achieved.

The oil industry continues to face a myriad of drawbacks in an endeavor to establish itself as one of the best sectors of the economy and these challenges include but not limited to hostile political environment, stringent government policies and regulations, and increased competition. Due to this myriad of challenges, the country continues to experience regular interruptions in terms of the petroleum products supply. Moreover, the petroleum products prices have been steadily rising time to time and this has been partly blamed on supply chains, which are inefficient and over-dependence on international crude oil. Another challenge that the oil industry has been facing in Kenya is the constant power outages as reported by consumer insight (2009) who observed that the supply channel of KPC were proven to be inefficient as such their systems of handling products were outdated and, therefore, unreliable to provide the best products to the final consumers.

According to Oluka (2007), the repairing and continued construction of pipelines across the country have made it possible for KPC to lower the costs of transportation within the country and across the neighboring countries such Uganda, which get their petroleum products from Kenya. For instance, the pipeline running to Nairobi from Mombasa has been experiencing challenges and as such, it has only been able to transport 50% of the protracted capacity and this has been partly attributed to poor administration. KPC customers have frequently complained of product outages in western Kenya depots, long durations taken to ascertain stock levels, communication bureaucracies within the company structure, time consumed on queues waiting to load, regulated product transfers and delayed product arrival at delivery points.

Several studies have been done on petroleum supply chain management. Kimani (2013) carried out a research on management drawbacks that supply chain faces in the petroleum industry in Kenya by specifically focusing on the challenging facing National Oil Corporation, his focus was on efficiency and not effective supply chain management by oil companies. Chima (2007) conducted a study on contemporary issues that face the gas and oil industry's supply chains. Research by Kelemen (1997), asserted that companies that had a future in the petroleum had had

to adopt demand- pull model in achieving their objectives. Kieyah (2011) also studied the petroleum industry in Kenya and established that leading petroleum companies have some level of power to influence activities in the industry. Irrespective of the operational drawbacks and significances, which the oil industry continues to face, the subject of supply chain function of pipeline companies continues to attract low scholarly attention in the strategic and SCM literature. Although some discussion on management of the supply of petroleum products can be found in literature evidenced by aforementioned studies, the basis of most of the literature is to oil marketing companies and in developed countries. This study, therefore, endeavors to examine the effects of fuel supply function on the management of petroleum products in Kenya with the specific case of Kenya Pipeline Company Eldoret depot.

1.3 Purpose of the Study

The purpose of the study was to establish the factors influencing supply of petroleum products in Kenya with specific reference to Kenya Pipeline Company, Eldoret depot.

1.4 Research Objectives

The study was guided by the following research objectives.

1. To establish the influence of storage capacity on supply of petroleum products by Kenya Pipeline Company
2. To determine the influence of pipeline infrastructure on the supply of petroleum products by Kenya Pipeline Company
3. To establish the influence of regulations on the supply of petroleum products by Kenya Pipeline Company
4. To determine the role of quality control on the supply of petroleum products by Kenya Pipeline Company

1.5 Research Questions

The study was guided by the following research questions.

1. What is the influence of storage capacity on the supply of petroleum products by Kenya Pipeline Company?
2. How does pipeline infrastructure influence supply of petroleum products by Kenya Pipeline Company?

3. How does regulations affect the supply of petroleum products by Kenya Pipeline Company?
4. What is the role of quality control on the supply of petroleum products by Kenya Pipeline Company?

1.6 Significance of the Study

The findings of this research will be significant to KPC strategic managers and decision makers as it will give valuable insights on the supply function of KPC with a view of providing the best approaches to overcoming the drawbacks in the management of petroleum products in Kenya. Moreover, the findings of the study will make it possible for the company to reexamine if its supply chain function has been as resilient and sustainable in relation to the set standards and the possible solutions in case it has not achieved the anticipated outcome.

The study is of importance to managers when they will be formulating their supply chain management policies. The Government of Kenya and Regulators may find this study useful to enable them to understand the effects of fuel supply function on the management of petroleum products thus formulate policies which are not negatively affecting the oil and gas sector.

The findings of the study will add to the present body of literature in the field of SCM of petroleum products. The researcher anticipates that the findings of the study will provide a springboard for more research in the field of supply chain function of KPC or any future related studies and as a resource for reference.

1.7 Basic assumptions of the study

It was assumed that the respondents answered questions correctly, honestly and provided all the required information. It was further assumed that the selected sample was adequate and representative of the population were reliable in arriving at reliable generalizations and conclusions.

1.8 Limitation of the Study

The essentials of the petroleum products in Kenya cannot be understated in the day-to-day life, yet the prices of these products can disrupt budgets and economic policies for countries because of perceived political sensitivity. Against this backdrop, the research anticipates challenges when collecting information from the fuel depot, as it is state-owned. Due to the busy nature of the employees at KPC, the researcher intends to employ a drop pick method as the said respondents

may not be able to fill the questionnaires immediately the researcher applies them. To this end, the researcher will provide the respondents with one week to read and fill the questionnaires as an approach to ensuring consistency and accuracy of information provided. The researcher anticipates that the laws of the company may inhibit the respondents from giving accurate information and as such the researcher will ensure confidentiality of the respondents by explaining to them that the information is for research and academic purposes only.

1.9 Delimitations of the Study

The study specifically focused on Kenya Pipeline Company with specific reference to Eldoret depot. The researcher collected data from managers who represent the company's SCM, loading personnel, supply analysts among other employees who work in supply chain department.

1.10 Definition of significant terms

Supply: A stock or amount of something supplied or available for use.
Storage capacity: this is the level at which KPC can be able to contain petroleum products at a given time in m^3.

Pipeline infrastructure: this is the basic physical structures and facilities that help in running the day to day operations.

Quality control: Quality control is a management philosophy that seeks to integrate all organizational functions to focus on meeting customer requirements and organizational objectives.

Regulations: Guiding principles designed to control or regulate the working environment.

Petroleum- Refers to the myriad of hydrocarbon-rich fluids that have accumulated in subterranean reservoirs.
Petroleum Products-Refers to the products obtained through the refinery process and they include gas oil, diesel fuel, and kerosene among other products.

1.11 Organization of the study

The study is organized into five chapters that is chapter one which comprises of background of the study, statement of the problem, purpose of the study, specific objectives, research questions, significance of the study, assumption, limitation of the study, delimitation of the study, definition

of significant terms, organization of the study. Chapter two covers literature review, conceptual framework diagram. Chapter three focusses on how the study will be carried out. It explains the research design, target population-sample size, data collection tools, data analysis, data collection procedure, reliability of the study, validity and ethical considerations, research instruments and also sampling procedure. Chapter four include data analysis, presentation, discussions and interpretation. Questionnaire response rate, demographic information. Chapter five has summary of findings, discussions, conclusions and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

This chapter reviews the relevant literature of the study with a view of simplifying and clarifying the research problem, research variables and identifies knowledge gaps. The chapter focuses on a theoretical review of the study. Review of empirical data on the four objectives of the study is also done in this chapter. A conceptual framework showing the interconnectedness between independent and dependent variables is also presented in this chapter. At the end of the study, the research gap is also provided.

2.2 Theoretical Framework

The study was anchored on the theory of supply chain operations reference theory. The theory of Supply chain operations reference model (SCOR) was first advanced by PRTM which is a management consulting company which was absorbed by price water house Coopers. SCOR was also adopted as a supply chain management diagnostic tool by supply chain council. By definition, Supply Chain Operations Reference theory is an instrument enabling the users to address, improve and communicate the activities within a supply chain and all the other parties involved. According to Simchi-levi (2008), SCOR spreads across from the sellers to the buyers. In its conceptualization, the model was purposed to visibly show the sequence involved in satisfying the customer demands and is based on process modeling, performance measurements, and best practices. Rolf (2007) argued that supply Chain Operations Reference model is based on a number of different management steps including, sourcing, planning, decision making, delivery and returning.

Planning is part of the management process which involves balancing supply and demand so as to come up with a course of action which meets supply chain requirements such as sourcing, manufacturing/production, and delivery requisition. The source is all about procuring of goods and services that will meet the demand in the market (Rolf, 2007). According to Shreekant (2012) Delivery entails the process of supplying finished products and services in order to satisfy customer demands and includes management of orders, transport, and supply of finished goods and services. Returns involve processes related to returning and receiving goods that have been returned by customers for reasons well known by the customers themselves. According to Peter (2003), the other assumptions covered by Supply Chain Operations Reference theory include

training, quality, information technology and general administration training, quality, ICT and general administration. The theory facilitates communication among supply chain actors hence improving efficiency. The theory also promotes supply chain relationships and collaborations such as horizontal integration. SCOR measures descries and carries evaluation which supports the firms' strategy implementation and business performance. Over 150 key indicators used to measure performance in the operations of the supply chain is contained in the pillar that measures performance. According to Shreekant (2012), the finest practices pillar indicates what activities should be performed once the performance of the supply chain operations has been measured and performance gaps identified. Simchi-Levi (2008) indicated that supply chain operations reference theory highlights the finest practices considering the currency and not emerging issues, planned with outlined goals, scope, process, and procedures, that is with this confirmed success and repeatable method for making a positive influence on desired operational results.

2.3 Review of related literature

2.3.1 Storage capacity and supply of petroleum products

Refined petroleum products once ascertained that they have met the required specifications in terms of quantity and quantities are transported various means such as road, rail or pipeline to the storage facilities which are close to the market. This process requires proper coordination of supply chain management strategies such as procurement and logistics including the volume to be transported, price and reliability of supply (Kojima *et al.*, 2010). Storage facilities and capacities exist at various points in the supply chain network and are considered very important because the stock held can be used to replenish the supply of petroleum products in case there is an artificial shortage (Bacon and Kojima, 2008).

Such kind of protection against artificial shortage is very important for countries that may not have a port. It is worth noting that building storage capacity is very expensive and also holding of stock within this capacity is also costly due to the financial cost involved. This has compelled the firms to hold contingency stocks to avoid a scenario where they run out of stock but also apply just in time inventory management similar to various other businesses; they focus on optimizing their capacity using other channels and connections in their supply and delivery

chain. When this kind of optimization is achieved, maximum cost efficiency is achieved. Similarly, contingency stock levels are also achieved as a result of a rigorous assessment of risk.

Another important consideration is the storage depot terminal which refers to a place where petroleum products can be stored for a given period of time. A **s**torage depot terminal is located strategically near markets or built at every production plant which is used to make decisions on the number of the storage depots required. The end of the supply line is the local retail outlet especially for consumer products but local retailers are primary display and selling locations that were bypassed by distributors. According to Coyle, Bardi & Langley Jr, (2003), product availability is determined by the number and location of warehouses because it determines the number of customers close to the warehouse. Facilities with mass production are responsive to supply variability while customization platforms are prone to longer production lead times.

Business performance and sub-optimization by design or default having minimal variation result to system-wide variation. Companies need an optimal balance between the possibility of idle capacity and having adjustable capacity facilities. Most companies are no longer simply contented with price as a determinant in procurement services but also the sustainability of the supply and ability to meet unpredictable and short notice supply instructions. (Ikram A 2005)

Almost every country is making an effort to increase its capacity of finished petroleum products because of the increasing demand for petroleum. India is building strategic crude oil storage facilities to contain a total of 5 million metric tonnes (about 35 million barrels, equivalent to 12 days of 2008 consumption) at three locations. Indian Strategic Petroleum Reserves Limited was established for this purpose; it is owned by the Oil Industry Development Board of the Ministry of Petroleum and natural gas underground rock caverns will be used for the storage, and the plan is to complete the three sites by 2012 (ISPRL, 2009). The National Oil Corporation of Kenya was charged in April 2008 with maintaining strategic stocks equivalent to 30 days of consumption and eventually to reach 90 days over the coming years (Anyanzwa, 2008). Just as large storage capacity can be a measure in mitigating the effects of shortages of petroleum products in the market, it is incumbent on governments not to unnecessarily intervene in fuel price adjustment as this can encourage hoarding of the commodity by dealers resulting in artificial shortages. Wide price disparities in our neighboring countries can also lead to smuggling, thus causing shortages.

2.3.2 Pipeline infrastructure and supply of petroleum products

In the petroleum industry, the supply chain consists of shipping on sea, oil tankers as well as pipelines that cut across various countries. The supply chain network plays an important role in transporting crude oil from wellhead to the refining facility for purposes of processing, to move intermediaries from one refining site to another facility and to move the finished products from the storage facilities to the distributors and eventually to the customers. In the case of any disruption emanating from the supply chain network globally, there can be serious effects in gaining efficiency in operations, quality of products, firms' profitability and meeting customer needs satisfactorily. It is important to note the pipeline infrastructure requires huge capital to construct. After construction, the cost of operation remains relatively low. Continuous-flow pipeline transport acts to eliminate separate vehicle loads by other modes of smooth, high-volume operation. In comparison with other means of transport such as road transport, pipeline transport is the most preferred and very competitive. This because of the very high profits that come as a result of bulk transportation hence enjoys economies of scale. This is achieved when there is a high demand to allow continuous use of the pipeline services. Due to considerably high levels of efficiency attained when the demand is enough to sustain high utilization of pipeline services, pipeline transport is hence competitive in comparison to other means of transport (Sexmith, 2010).

The trunk lines are used to transport crude oil to the refinery. The crude oil is transported from the storage tanks, ships, barges, gathering systems and other trunk lines. The gathering pipelines form part of logistics parts of oil product supply chain network. In the trunk line, larger volumes of crude oil are transported to fewer delivery areas. It is important noting that the delivery line has smaller volumes being moved to more delivery areas. In general, the trunk lines is replaceable which means that the customer can get the exact quality of product requested but not the same molecules tendered for. According to Allegro Energy Group (2001), the delivery line work in group mode, the shipper gets the exact molecules requested for shipping. The pipelines that transport the products are systems that are used to deliver refined petroleum products to the seaports from the refineries and to the market points. The products are often taken to retail outlets and wholesalers using trucks. The systems for refined products works converse to crude-oil gathering systems.

According to Bharadwaj, (2000) pipelines that transport products are part of the supply channels or outbound logistics forms oil products supply chain networks. Apart from tiny streams moving into high-volume pipelines through tank farms, pipelines that carry products otherwise known as product pipeline come as a system with large capacity at refineries and subdivide into numerous small capacity pipelines for purposes of serving delivery points that are dispersed, mostly wholesale depots in the marketplaces.

2.3.3 Regulations and supply of petroleum products

According to Lin &Sheu (2012), regulation refers to the sustained and focused control practiced by a government agency over activities undertaken by community or organization. Regulation helps in controlling unwanted behaviors and activities and enables the desired activities and behaviors. Establishing specific and well down rules and commands is one regulation that has to be adhered to. Regulations also encompass those actions meant to influence firms and individuals which are comprised of political hostilities, taxation, contract requirements, subsidies, franchising and licensing (Selnick, 1985). Lin & Sheu (2012) in their study indicated that the petroleum industry has over the years continued to face a myriad of hurdles such as political risks, unfavorable and strict government regulations, stiff competition and the threat of new and emergent entrants which affects the pricing and demand/ supply of petroleum products. It is worth noting that the availability of petroleum products is not the main challenge facing the industry but rather putting the oil reserves into processing and ensuring that the products get to the final consumers at a lower cost. Therefore a formidable supply chain management strategy can ensure that this goal is achieved.

Olugu & Wong (2012) indicated that the regulations which include policies and laws that currently govern mining in Kenya require a lot of reform if the industry is to expand and grow so as to contribute to the development of the economy and reduce poverty at the county level. Given that regulations impact profoundly on companies financial decisions, it is taken as an important driver in the petroleum industry proving incentives or sometimes discouraging. The main aim of regulation is to promote competition among firms and to boost social welfare. There certain cases where there is a conflict between social and private interests which can come up when for instance a regulation that supports competition and restricts monopoly behavior also jeopardizes the companies incentives to put more capital in the investment. As Laffont and

Tirole (2000) in their study indicates that there is a tradeoff between encouraging competition in order to promote social welfare when the infrastructure has been put in place and encouraging the existing firms to invest and then repair and maintain the infrastructure. It is evident from the extant literature that many scholars have studied this issue providing both theoretical and empirical evidence which have gone a long way in informing policy making. Many studies focus on incentive regulation and regulation on oil supply by oil marketing companies.

Kenya Pipeline Company must seek to align crucial dimensions to integrate their strategies with rigorous insight into the social, economic and strategic effect of different regulatory outcomes. The company must also understand the competing needs of crucial stakeholders and harmonize with the restrictions of regulatory outcomes. This is important if firms realize their goals by translating priorities into tenable compromises even if compromising is not favorable in the short run. Organizations must at the end take regulations to assure the quality of products. Quality control a constant process that is integrally linked to strategic functions and run by a high-level executive with a strategic perspective and easy access to the CEO.

Mwirichia (2011) indicated that ERC is a regulatory agency in the energy sector whose sole responsibility is the formulation of technical and economic regulations of renewable energy and electric power including enforcement of compliance, licensing, approval of network service contracts, approval of power purchase and licensing. This is corroborated by the Energy Act No. 12 of 2006 which states in Section 5(a) (ii) that "the objects and functions of ERC include regulating the importation, exportation, transportation, refining, storage and sale of petroleum and petroleum products. Section 102 of the Act empowers the Minister to make regulations upon recommendation by the Commission on petroleum-related activities including determination of retail prices for petroleum products" (Katisya-Njoroge, 2010).

The government of Kenya enacted the Energy (Petroleum Pricing) Regulations, 2010 on December 2015. The regulations were aimed at ensuring that certain petroleum products were available in all parts of the country, the stability of prices of specific petroleum products in the country and reducing price variability of selected petroleum products in Kenya (Katisya-Njoroge, 2010). With the enactment of the regulations came the price control of petroleum

products by the government. The energy regulatory commission is mandated to set prices for petroleum products using a formula decided by them. The formula used is, however, a subject of contestation by the Oil marketing companies. The government price control of petroleum products in Kenya existed after 1994 when deregulation was adopted as a result of challenges of economic nature that the government faced. During this period there was a devaluation of the Kenya currency against the hard currency such as the dollar due to inflation that made regulation not feasible.

2.3.4 Quality control and supply of petroleum products

The concept of quality control has been in existence for decades, however, its meaning over time has changed over time. In the early twentieth century, quality control was taken to mean inspection of products to ascertain whether they met the required specifications. During the Second World War, companies had adopted the use of statistical sampling method to assess the quality. Quality control charts were also used in monitoring the process during production. Quality control is aimed at ensuring that the interests of the consumers are upheld by adhering to the required specifications in the marketing of petroleum products that have a direct impact on the lives of the citizens of a country. The petroleum products include kerosene petrol and diesel hence ensuring that the final consumers get the product in the recommended quality and that the supply is stable. According to Lagrosen (2010), quality control also aims at emphasizing the need for the adherence to international agreements on prevention and reduction of water pollution as result of fuel oil.

There is considerable and growing interest in quality for several reasons: customers' increasing demanding quality requirements, higher competition in markets, demands for improved profitability and growing complexity of goods and services as well as product liability legislation (Sandholm, 2000). The downstream petroleum industry plays a major role in the Kenyan economy and covers the entire supply chain network from the refinery, transport, sales and marketing of petroleum products. It is therefore important for the downstream petroleum sector to apply quality control mechanism in their day to day operations because any compromise on quality can lower the output as well reduce performance. If implemented successfully, quality control will enable companies to meet customer expectations.

Kanter (2003) argued that quality control is the philosophy of management whose aim is to put together all functions of a firm to meet customer specifications and organizational goals. Before implementation, quality control requires proper planning since it embodies the philosophy of excellence and performs well when incorporated into the organizational culture (Iyayi 2004).

The definition of quality is determined by the customer which translates to customer satisfaction and leads to the enhanced competitive advantage of the firm. In order to reduce cost, minimizing cost as a result of waste must be reduced significantly and the problem of rework eliminated completely. As pointed out by Iyayi (2004), training and education, organizational culture, leadership and organizational commitment and teamwork contributes an implementation of quality control in an organization. Organizational change must also be embraced by the employees both in practice and behavior. The real barriers to successful implementation of quality control are a human resource and organizational issues. The difficulty in the implementation of change concerning quality control in an organizational is brought by the difference in strategy from the old one to the new strategies and hence it is true to say that the greater the difference in strategy the greater the level of resistance hence the need to minimize the gap between the two.

According to Allen *et al.,* (2001), quality control should be clearly articulated in line with the organizational objectives and planned properly for it to be successful. The management of organizations should instill the spirit and willingness of change among employees for it to be successful. Important areas to consider include leadership skills, rewards and recognitions, communication and early wins (Pascale et al., 1997). According to Sebastianelli *et al.*, (2003), the main impediments to success in quality control implementation are lack of appropriate organizational culture, financial cost, poor communication, lack of employee empowerment, lack of continuous improvement and lack of top management commitment.

Balasubramanian (2010) observed that quality control of petroleum products has been successful especially petrol, kerosene and diesel has been key in the improvement of the listed areas. To enable oil transportation companies to deliver fuel oil to exacting specifications, quality control is the next item on the agenda that needs full development and implementation. The end users of the petroleum products are supplied with products of varying qualities in an effort to strike a balance between furnace combustion and engine performance as compared to fuel prices. The

current specification is not transparent enough to enable the application of this method hence the customers can only rely on the price of the various petroleum products.

At the Kenya Pipeline Company, petroleum products are transported in batches or in a single line at specified intervals in a period of time. In transportation, ensuring that the products are not contaminated is very essential. In order to guarantee quality of the petroleum products, KPC has a section dedicated to quality control whose role is to give assurance of the quality standards of the oil products being transported by the pipeline. Various sources of contamination of oil products exists which the organization needs to focus on. Kenya Pipeline Company has well-established laboratories and qualified, skilled personnel whose role is to undertake laboratory tests to check for quality of the products. The quality control section in KPC has enable the company to deliver oil products with high quality that adhere to national and international standards.

The quality control laboratories are located at entry points as well as delivery points and ultra-modern laboratory has been constructed in Mombasa which is being operated by an independent operator to guarantee quality. The international (American Society for Testing & Materials and Institute of Petroleum (IP) standards is being used in the laboratories in testing the products for quality. Before the products are issued to the Oil Marketing Companies (OMC), the products are recertified at the receiving station. It is im0ortant to note that Kenya Pipeline Company takes part in Inter-laboratory Cross Check program on testing of Jet A-1 coordinated by ASTM to benchmark with other laboratories across the world.

2.4 Summary and research gap

Literature has revealed the different types of transportation channels used in delivering petroleum products to the final consumer. Review of literature indicated that pipeline is the cheapest form of land transport. Storage capacity is considered very important in pipeline transport because it is used as a strategy for stock reserves to ensure sufficient supply for purposes of distributing to consumers.

All the countries both in developed and developing countries store enough petroleum products in case of financial difficulties to avert the problems that may arise due to shortage of petroleum products. The prices of petroleum products are affected by factors such as infrastructural

difficulties, speculation, and hoarding, government regulations, political risks, smuggling and conflicts situations. Empirical evidence also suggested that supply function of petroleum products requires intensive application of information technology.

Cavinato et al. (2002), argues that the objective of every supply chain, including the global oil industry, is to maximize the overall value generated. The value [to an organization, or to a nation] a supply chain generates is the difference between what the final product is worth to the customer, and the effort the supply chain expands in filling the customer's request. Barua (2010) carried out a study on the challenges facing supply chain management in the oil marketing companies in Kenya and the findings showed that challenges occur in one or more of the supply chain components that is, transportation, equipment, communication, suppliers, customers. According to Kelemen (2008), The end consumer in the petroleum supply chain is supplied through the coordinated activities of the whole supply chain, starting from crude oil exploration and production deliveries through thousand kilometers pipeline or in oil tankers, to very capital intensive and complex refineries, to final marketable products, to supply by pipeline, ship, railcar, barge or road tanker to the end user. Petroleum supply chain, unlike the other supply chains, is demand driven i.e. the demand pulls the movement of the material from the refinery to the end consumer. It is evident from the review literature that little attention has been given to the supply chain management of petroleum products especially on the downstream including the transportation through the pipeline. This study, therefore, sort to fill the research gap by identifying the effects of fuel supply function on the management of petroleum products using a case study of Kenya Pipeline Company.

2.5 Conceptual Framework

According to Kombo & Tromp (2009), conceptual framework is defined as a set of principles derived from appropriate area of inquiry and used to relate a given presentation. Conceptual framework is an instrument that helps the researchers to understand the pertinent issues under study and be able to effectively communicate. The researchers use conceptual framework to decipher useful meanings in the findings of the study. A conceptual framework forms part of the main area of inquiry to be studied, reviewed and tested as a result of field investigations and explain any possible relationships among the variables (Smyth, 2004). The conceptual framework shows the relationship between dependent and independent variables that will be

used in the study. The independent variables include storage capacity, infrastructure, quality control, and regulations. The dependent variable is the management of petroleum products.

Figure 2.1 Conceptual framework

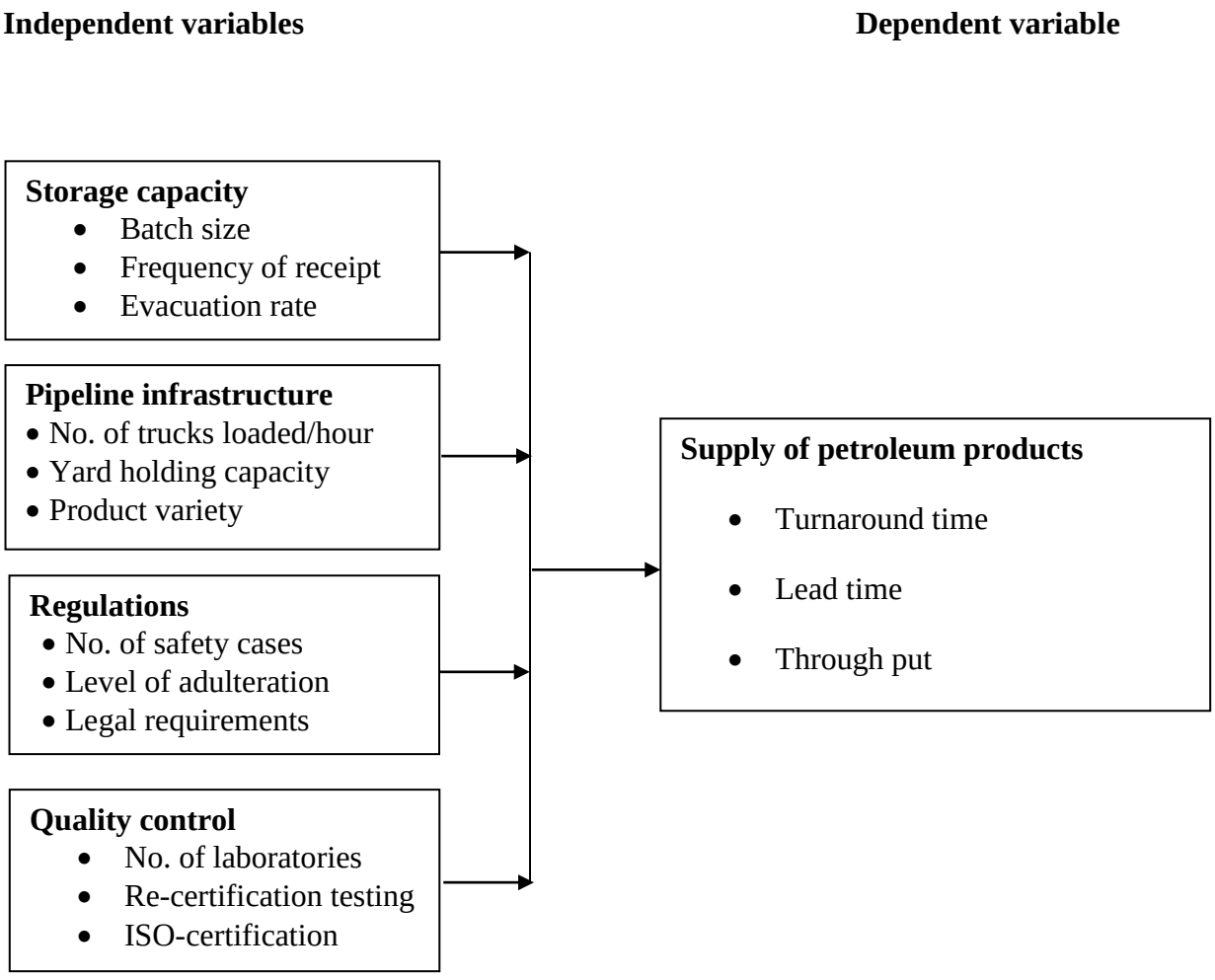

Figure 2.1: Conceptual framework

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter represents the research methodology and discusses the methodological and research approaches that will be used in the study. In particular, the chapter looks at the research design, sampling procedures and sample size, instruments of data collection, data collection methods and the data collection techniques that will be used to meet research objectives.

3.2 Research Design

This study used descriptive research design to establish the influence of fuel supply function on the management of petroleum products in Kenya with specific reference to Kenya Pipeline Company Eldoret depot. The researcher chose the case study research design because it enhances the understanding and evaluation of complex issues. Moreover, a case study research design made it possible for the researcher to undertake a robust and in-depth research with a view of realizing a holistic and explanation and examination of phenomenon.

3.3 Target population

The target population of this research comprised of eighty-four (84) respondents consisting of seventy Oil Marketing Companies (OMCs) registered as per Ministry of Energy 2017 records operating at the Eldoret depot. Four supply and planning officers, six supply analyst, two loading superintendents for loading terminal and two product accounting officers dealing with product requests, transfers and billing at KPC as per human resource records 2017.

Table 3.1: Target population

Target group	**Target population**
Oil marketing companies (OMCs)	84
Supply and planning officers	4
Supply analysts	6
Loading superintendents	2
Product accounting officers	2
Total	**98**

Source: Ministry of Energy, 2017 (Kenya)

3.4 Sample size and Sampling procedure

The section covered the sample size and sampling procedure.

3.4.1. Sample Size

Yamane (1967) provided a simplified formula to calculate sample sizes. Assumption:

97% confidence level

e = 0.03;

$$n = \frac{N}{1 + N(e)^2}$$

Where: n = sample size

N = Target population

e = the accepted sampling error

n = 98/1 +98(0.03)^2

98/1.0882

=91

The sample size was 91 respondents from the target population. By using Yamane's formula of sample size with an error of 3% with confidence levels of 97% (Yamane, 1967) a population of 98 respondents translated to a sample size of 91 respondents as shown in table 3.4

Table 3.2 Sample Size

Target group	**Target population**	**Sample Size**
Oil marketing companies (OMCs)	84	84/98*90 = 77
Supply and planning officers	4	4/98*90 = 4
Supply analysts	6	6/98*90 = 6
Loading superintendents	2	2/98*90 = 2
Product accounting officers	2	2/98*90 =2
Total	**98**	**91**

Source: Ministry of Energy, 2017

3.4.2 Sampling Procedure

Marketing Companies registered by the Ministry of Energy to trade in the importation, supply, and exports of petroleum products and which were actively importing and transporting their products through the Kenya Pipeline will be used. Therefore due to the low number of companies, all the population will be picked as the sample. Mugenda (2003) suggest that where the population is small, the entire population can be taken as a sample.

3.5 Research instruments

The study used questionnaires as the research instruments. The study collected data through the process of self-administering questionnaires from the study respondents. The questionnaire was formulated using Likert scale type of questions rating from strongly agreed to strongly disagree. The structure of the questionnaire reflected the objectives of the study by capturing both dependent and independent variables.

3.5.1 Piloting of instruments

The researcher tested the internal consistency of the questionnaire by applying Cronbach's alpha and this because the questionnaire contains multiple questions, which respondents are required to answer. It is imperative to point out that the research will use Cronbach's alpha coefficients that range from 0 to 1, whereby coefficients above 0.7 indicates internal consistent of the research instrument (Nunnaly, 1978). To enhance the reliability of the research instrument for this study, a pilot study will be conducted, whereby the researcher will test the internal consistency of the questionnaire by applying questionnaires to 10% of the total population of the study, which will not be part of the final study. According to Sakaran (2010), a sample of 10% respondents can be obtained from the same target population and consequently the research will apply Cronbach's Alpha to calculate the internal consistency of the questionnaire.

3.5.2 Reliability and Validity Tests

Validity was measured using the methodology proposed by Crocker *et al* (1986) which calculates validity coefficients that identify what percentage of variance in the criterion variable is factored for by the calculating measure, or independent variable. In addition, validity of the instruments will be scrutinized together with my supervisor. The calculation of both reliability and validity will be done using the results of the pilot study. The researcher will calculate the internal consistency of the questionnaire by applying Cronbach's Alpha coefficient.

The aim is to get their feedback on the clarity and adequacy of the questions in collecting the target information (Neuman, 2000). In the current study, pilot questionnaires will be administered through drop and pick method to one Oil Marketing Company in Nakuru depot and will not be included in the target sample. Their feedback will be used to improve the questionnaires and compute the reliability coefficient.

Reliability Statistics

Cronbach's Alpha	No. of Items
0.872	47

The research instrument was found to be reliable as the Cronbach's alpha was 0.872 thus the questionnaire was consistent.

3.6 Data Collection procedure

Before commencement of the study, authorization was sought from authorized institutions (NACOSTI), University of Nairobi and KPC. Data was collected in a period of five working days. A pre-visit was done to prepare for the actual data collection process.

3.7 Data analysis techniques

After successful data collection, collected data was organized for processing. This involved; coding the responses, organizing the data and undertaking several statistical computations. Using SPSS statistical software, the study employed descriptive statistics to analyze data collected. The analysis procedure was uniform in all study objectives where descriptive statistics was used. Descriptive statistics encompasses the calculation of percentages, mean, frequencies on the independent variables to summarize and classifying the data collected into meaningful form for easy interpretation.

3.8 Ethical considerations

After validation of research tools, the researcher sort authorization from relevant authorities to gather information for the research. The self-administered questionnaires were distributed to the respondents and collected. Follow-ups was done using telephone calls, and personal appearance in the event that the questionnaire is not received, hence additional copies of the questionnaire will be administered.

3.9 Operational definition of variables

Table 3.1 Operationalization of variables

Objectives	Variable	Measuring indicators	Data collection instruments	Scale	Method of data analysis
To find out the influence of storage capacity on the management of petroleum products by Kenya Pipeline Company	Storage capacity	Batch size Evacuation rate	Questionnaire	Nominal Ordinal	Descriptive
To assess the influence of pipeline infrastructure on the management of petroleum products by Kenya Pipeline Company	Pipeline infrastructure	No. of trucks loaded per hour Yard holding capacity	Questionnaire	Nominal Ordinal	Descriptive
To investigate the influence of regulations on the management of petroleum products by Kenya Pipeline Company	Regulations	Level of adulteration Legal requirements	Questionnaire	Nominal Ordinal	Descriptive

To determine the role of quality control on the management of petroleum products by Kenya Pipeline Company.	Quality control	No. of laboratories Re-certification testing ISO-certification	Questionnaire	Nominal Ordinal	Descriptive

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION, DISCUSSION AND INTERPRETATION

4.1. Questionnaire response rate

A total of 91 questionnaires were given to respondents, with 87 of that questionnaire were correctly filled and returned. This represented a 95.6% questionnaire response rate. According to Kothari (2010), a response rate of 65% is sufficient to continue with the study.

4.2 Demographic information

The study sort to capture the general information of the respondents involved in the study.

4.2.1 Position of the respondents

The researcher sort to determine the various positions the respondents held with the company.

Table 4.1: Position of respondents

Position of the respondent

	Frequency	Percent	Cumulative Percent
Oil marketing manager	78	89.7	89.7
Supply and planning officer	4	4.6	94.3
Loading superintendent	2	2.3	96.6
Product accounting officer	3	3.4	100.0
Total	**87**	**100.0**	

From table 4.1 oil marketing managers were 89.7 % (78), supply and planning officers were 4.6% (4), loading superintendent were 2.3% (2) and 3.4% (3) were product accounting officers. This was a full representation of the respondents within the research scoop. This represented the personnel that handled the various positions that the research covered thus a full representation of the company's employees.

4.2.2 Level of Education of Respondents

The research wanted to determine the level of education of the respondents who participated in the research.

Table 4.2: Level of formal education

Level of formal education

	Frequency	Percent	Cumulative Percent
Diploma	11	12.6	12.6
Bachelor's degree	72	82.8	95.4
MA/MSC/PhD	4	4.6	100.0
Total	87	100.0	

From table 4.2 the study found out that 12.6% (11) had attained diploma level, 82.8% (72) had a bachelors' degree, and 4.6% (4) had MA/M.Sc./PhD. This was essential in determining the efficiency of the respondents in answering the questions effectively. This was important in determining the proneness of the respondents in their areas of expertise within the company thus proper answering of questions aligned to the study.

4.2.3 Duration of employment

The study sort to determine the period the respondents had worked with the company.
Table 4.3: Working experience

Working Experience

	Frequency	Percent	Cumulative Percent
less than 5years	39	44.8	44.8
5 - 10 years	33	37.9	82.8
Above 10 years	15	17.2	100.0
Total	87	100.0	

From table 4.3, 44.8% (39) of the respondents had worked for less than five years, 37.9% (33) had worked for a period of between 5 years and 10 years and 17.2% (15) had worked for more than 10 years. This was used to determine the respondents' knowledge with the organization and how the various factors being discussed had effects within the operations at the depot.

4.3 Storages capacity and supply of petroleum products

The study sort to establish the connection between storage capacity and the supply of petroleum products within the Kenya Pipeline Company Eldoret Depot.

4.3.1 Batch size and supply lead time

The study sort to establish how batch size affected supply lead time of petroleum products within the supply cycles.

Table 4.4: Batch size and supply lead time

The batch size capacity within the Kenya pipeline Eldoret deport determines the lead time of petroleum product supply					
	Frequency	Percent	Cumulative Percent	Mean	Std.
Strongly agree	33	37.9	37.9		
Agree	44	50.6	88.5	1.7356	0.655208
Undecided	10	11.5	100.0		
Total	87	100.0			

From the findings in table 4.4, 37.9%(33) of the respondents strongly agreed that the batch size capacity at the Kenya Pipeline Eldoret Depot determined the lead time of petroleum product supply, while 50.6%(44) agreed to this and 11.5%(10) were undecided. From this findings, 88.5% of the respondents anonymously agreed that batch size capacity of the depot affected the lead time of petroleum products to be supplied. The descriptive statistics showed that most of the respondents (M=1.7356 and Std. = 0.655208) agreed with this statement. This was in agreement with Mikati, 2010 who argued that the most important factor determining order rate is the batch size. The reliance is examined for different operational conditions using system dynamics simulation of manufacturing models comprising quality control units that are the bottlenecks affecting the system. This is shown that there is an optimal batch size that results in a minimum lead time. Below optimal batch size, lead time increases sharply due to congestion at the bottleneck. The results have implications in supply planning and implementation of supply improvement.

4.3.2 Batch size and turnaround time of supply

The study sort to determine how batch size affected the turnaround time of petroleum products supply at the Kenya Pipeline Eldoret Depot.

Table 4.5: Batch size and turnaround time of supply

Batch size supply determines turnaround times at which different products are received and distributed at the depot					
	Frequency	Percent	Cumulative Percent	Mean	Std.
Strongly agree	22	25.3	25.3		
Agree	49	56.3	81.6		
Undecided	11	12.6	94.3	1.989	0.785
Disagree	5	5.7	100.0		
Total	87	100.0			

From table 4.5, 25.3% (22) of the respondents strongly agreed, 56.3% (49) agreed, 12.6% (11) were undecided while 5.7% (5) disagreed. From the findings in table 4.5, a cumulative percentage of 81.6% felt the effects of batch size on turnaround time at the Depot. From the descriptive results suggested that majority of the respondents (M=1.989 and Std. = 0.785) agreed that batch size determined the turnaround time of petroleum products at the depot. This affected the rate of supply of different petroleum products within the depot. Batch size is dependent on tankage capacity meaning batches are determined by the availability of space to store these products. Every product is stored in different tanks which have different capacities depending on demand of each product.

4.3.3 Frequency of Supply

The study sort to establish how frequency of supply of petroleum products contributed to supply of these products.

Table 4.6: Frequency of Supply

The frequency at which the supply of petroleum products at the Eldoret depot determines the throughput of the products at different instances.					
	Frequency	Percent	Cumulative Percent	Mean	Std.
Strongly agree	45	51.7	51.7		
Agree	26	29.9	81.6		
Undecided	14	16.1	97.7	1.670	0.827
Disagree	2	2.3	100.0		
Total	87	100.0			

From table 4.6 showed that 51.7% (45) of the respondents strongly agreed that frequency of supply of petroleum products at the Eldoret depot affected supply so were 29.9% (26) of the respondents who agreed to this compared to 2.3% (2) who disagreed while 16.1% (14) of the respondents were undecided. From the findings in table 4.6, a cumulative percentage of 81.6% of the respondents believed that frequency supply of petroleum products played a key role in the supply of these products this was supported by descriptive results that showed that (M= 1.670 and Std. = 0.827). Eldoret depot is served by two separate pipelines meaning, two different products can be received at the same time. To increase throughput, more product should be available at any given period to ensure loading is not interrupted. According to (De La Sante, 2006; Rocha-Lona et.al 2013) states that supply forms an important activity of the integrated supply chain management of petroleum products. Various persons and entities are often responsible for the handling, storage and supply of such products. In some cases, however, a person or entity involved in the supply of pharmaceutical products is only involved in and is responsible for certain elements of the supply process. The relevant sections should be considered by various role players as applicable to their particular role in the supply process.

4.3.4 Rate of supply and turnaround time of product

The study wanted to establish whether the rate of supply of petroleum products played a role in the turnaround time of various petroleum products.

Table 4.7: Rate of supply and turnaround time of product

The rate of supply of the petroleum product at the Eldoret Depot affects the turnaround time of different or similar products.					
	Frequency	Percent	Cumulative Percent	Mean	Std.
Strongly agree	32	36.8	37.2		
Agree	44	50.6	88.4	1.7674	0.7141
Undecided	8	9.2	97.7		
Disagree	3	3.4	100.0		
Total	87	100.0			

Table 4.7 shows 41.1% (36) of the respondents strongly agreed another 54.0% (47) agreed while 4.6% (4) were undecided. A cumulative percentage of 95.4% of the respondents attributed that the supply of petroleum products at the Eldoret depot at a single time determined the turnaround cycle of the various petroleum product available for supply at that given time. Results obtained from descriptive analysis supported this statement (M=1.7674 and Std. =0.5729) agreed upon by the respondents. Response time is the time between when a customer places an order and

receives delivery. Chopra 2003; Fahimnia et.al 2013 stated that product variety was the number of different products that a customer desired from the supply point. Availability was the probability of having a product in stock when a customer order arrived. Customer experiences included the ease with which the customer could place and receive their orders. Order visibility was the ability of the customer to track their order from placement to delivery. Supply rate was termed as the ease with which a customer could return unsatisfactory product and the ability of the network to handle such returns. It may seem at first that a customer always wants the highest level of performance along the stated dimensions. In reality, this is not always the case.

4.3.5 Requisition of new product and lead time of petroleum supply

The study sort to establish how requesting of new petroleum products affected the time taken for supply.

Table 4.8: Requisition of new product and lead time of petroleum supply

The requisition of new petroleum products within the supply chain of Eldoret Depot determines the lead time of petroleum supply					
	Frequency	Percent	Cumulative Percent	Mean	Std.
Strongly agree	39	44.8	44.8		
Agree	37	42.5	87.4	1.6782	0.6904
Undecided	11	12.6	100.0		
Total	87	100.0			

Table 4.8 showed that 36.8% (32) of the respondents strongly agreed that rate of supply relied on the requisition of new products that was affected by turnaround time. 50.6% (44) of the respondents agreed while 3.4% (3) disagreed and 9.2% (8) were undecided. From the findings in table 4.8, a cumulative percentage of 88.4% argued that indeed the supply rate of new products which were different affected the turnaround time for similar of different products. Descriptive results agreed with this statement with a (M=1.6782 and Std. = 0.6904). This was in support of Achieng' and Rotich 2013 where they stated that petroleum sector in Kenya was competitive, thus striving to achieve highest levels of consumer satisfaction. This was contributed by the method of supply used which would results in loss of business through cancelled orders thus damaging company's image.

4.4 Pipeline Infrastructure and supply of Petroleum Products

4.4.1 Number of Trucks Loaded and Product Clearance

The study sort to establish the relationship between the numbers of trucks loaded in a single day and clearance of the petroleum products available at the depot.

Table 4.9: Number of Trucks Loaded and Product Clearance

Number of trucks loaded per day affects turnaround time of product clearance from the Eldoret depot.					
	Frequency	Percent	Cumulative Percent	Mean	Std.
Strongly agree	51	58.6	58.6	1.5632	0.7424
Agree	23	26.4	85.1		
Undecided	13	14.9	100.0		
Total	87	100.0			

Table 4.9 shows that 58.6% (51) of the respondents strongly agreed, 26.4% (23) agreed while 14.9% (13) were undecided. From the findings, a cumulative percentage of 85.1%(78) of the respondents opinioned that the number of trucks loaded per day affected the turnaround time of products clearance allowing for provision of new products. The findings were further supported by descriptive results that showed that most of the respondents (M=1.5632 and Std. 0.7424) Bartholdi & Hackman, 2002 states that for any progressive supply transportation is a key component of easing congestion of products within the storage facilities. Further, Somuyiwa (2010) revealed that the supply problem from companies to various customers was inefficient at both the system and firm levels due to infrastructural shortfalls and mismatches in form of inventories and facilities.

4.4.2 Number of Trucks Loaded and Through Put of Petroleum Products

The sort to establish how the number of trucks loaded and a given day or time contributed to low or high throughput at the depot.

Table 4.10: Number of Trucks Loaded and Through Put of Petroleum Products

Number of trucks loaded per day contributes to high/low throughput of products at the Eldoret depot.					
	Frequency	Percent	Cumulative Percent	Mean	Std.
Strongly agree	45	51.7	51.7	1.5977	0.6898
Agree	32	36.8	88.5		
Undecided	10	11.5	100.0		
Total	87	100.0			

Table 4.10 shows how the number of trucks loaded per day contributed to the high/low volumes of throughput of the petroleum products at the Eldoret depot. This was in relevance with 51.7% (45) of the respondents strongly agreeing, 36.8% (32) agreeing while 11.5% (10) were undecided. According to descriptive results majority of the respondents (M=1.5977 and Std. = 0.6898) were in favor of this statement. According to Abrail 2010, refined products were transported over shorter distances by road or railway networks, but the dispersal of end consumers and the diversity of the products transported posed specific problems Furthermore, pipelines transporting refined products were relatively rare within the various regions. Even markets whose significance in terms of unit consumption was small required refined products in all their different forms: solid (bitumen), liquid (fuel oils, gasoline fuels) and gas (Liquefied Petroleum Gas, LPG).

4.4.3 Company capacity and provision of products.

The study sort to find out how the company's storage capacity was enough to hold enough petroleum products which had effects on the throughput at the depot.

Table 4.11: Company capacity and provision of products.

Table 4.11: The company's' capacity to hold enough petroleum products that has effects on the throughput of the Eldoret Depot

	Frequency	Percent	Cumulative Percent	Mean	Std.
Strongly agree	35	40.7	40.7	1.6860	0.6373
Agree	43	50.0	90.7		
Undecided	9	9.3	100.0		
Total	87	100.0			

From table 4.11 40.7% (35) of the respondents strongly agreed that the facility had enough capacity to store the petroleum products, 50.0% (43) of the respondents agreed while 9.3% (9) were undecided. From the findings, a cumulative percentage of 90.7% (78) were aware of the company's capacity that was able to handle enough petroleum products which affected the throughput at the depot. The study descriptive results supported this (M=1.6860 and Std. = 0.6373). The system of trucks that move refined products from the depot to marketing areas, are generally categorized as the primary petroleum supply system. A considerable amount of tankage must be provided within this transportation network in order to maintain normal flexibility for the overall operation of the supply system. The petroleum supply system also includes the secondary supply system and the consuming sector, which contain substantial capacity and tankage (An et.al 2011).

4.4.4 Petroleum products and supply of products

The study wanted to know how the company's capacity to accommodate different petroleum products and different times affected the lead time of provision of other products.

Table 4.12: Petroleum products and supply of products

The company's' capacity to accommodate different petroleum products and different instances contributes to the lead time of provision of other products at those times.					
	Frequency	Percent	Cumulative Percent	Mean	Std.
Strongly agree	32	36.8	36.8	1.9310	0.8462
Agree	31	35.6	72.4		
Undecided	22	25.3	97.7		
Disagree	2	2.3	100.0		
Total	87	100.0			

Table 4.12 shows that 36.8%(32) of the respondents strongly agreed, 35.6%(32) agreed that the company's capacity to hold different petroleum products had effects on the lead time of other products at those same times, this was contrary to 2.3%(2) who disagreed. Those who were undecided were 25.3% (22). From the findings, it was evident that most of the respondents as descriptive results showed that 72.4% with (M= 1.9310 and Std. = 0.8462) agreed that indeed the company's storage capacity to accommodate different products and different times contributed to lead time which was a problem affecting the company. With increased demand of petroleum products within the areas supplied with the depot, the need for expounded storage capacity is required as supply and demand balance is becoming increasingly tight by the day, and being cited as one of the factors causing unavailability of this products within those specified times (Hirrai et.al 2008).

4.4.5 Availability of petroleum products and turnaround time

The study sort to establish how availability of petroleum products contributed to turnaround time at the Eldoret depot.

Table 4.13: Availability of petroleum products and turnaround time

The different petroleum products available at the depot has effects on the turnaround time of supply of the same or different products					
	Frequency	Percent	Cumulative Percent	Mean	Std.
Strongly agree	21	24.1	24.1	2.0575	0.8939
Agree	49	56.3	80.5		
Undecided	10	11.5	92.0		
Disagree	5	5.7	97.7		
Strongly disagree	2	2.3	100.0		
Total	87	100.0			

Table 4.13 shows that 24.1% (21) of the respondents strongly agreed, 56.3% (49) agreed that availability of petroleum products at the depot had effects on the turnaround time. This was in contrast to 5.7% (5) who disagreed and 2.3% (2) who strongly agreed while 11.5% (10) who were undecided. The findings suggested that when the petroleum products are available the turnaround time is affected thus different products are determined by this as proved by descriptive results (M = 2.0575 and Std. = 0.8939). With increased production, consumer needs are also increased thus need for new supply channels of products to satisfy this needs. This was in line with Ikram, 2005 who stated companies needed an optimal balance between the possibility of idle capacity and having adjustable capacity facilities. Most companies are no longer simply contented with price as a determinant in procurement services but also the sustainability of the supply and ability to meet unpredictable and short notice supply instructions.

4.4.6 Availability of petroleum products at similar period

The study sort to establish how availability of petroleum products at similar times affected the provision and availability of other products at those times.

Table 4.14: Availability of petroleum products at similar periods

The available petroleum products at the depot within specific times affects how other petroleum products are availed to the depot with the same periods of time.					
	Frequency	Percent	Cumulative Percent	Mean	Std.
Strongly agree	35	40.2	40.2	1.9655	0.9818
Agree	26	29.9	70.1		
Undecided	22	25.3	95.4		
Disagree	2	2.3	97.7		
Strongly disagree	2	2.3	100.0		
Total	87	100.0			

From table 4.14 40.2% (35) of the respondents strongly agreed that when a certain petroleum product is available at that specific time affects the availability of different petroleum product within the same period, 29.9% (26) agreed to this while 2.3% (2) disagreed and 2.3% (2) strongly disagreed, 25.3% (22) of the respondents were undecided. From descriptive results (M=1.9655 and Std. = 0.9818) it showed that majority of the respondents agreed to this statement. This showed that the availability of petroleum products within the depot had reliance with the supply of the existing petroleum products thus caused inconveniences. According to Alley et.al 2014 state that poor state of facilities was a major contributor to the present fuel crisis. All the depots within the various places had insufficient storage facilities thus not all products were available at all times.

4.5 Regulations and supply of petroleum products

The study sort to establish how the set regulation within the KPC Eldoret depot contributed to the supply of petroleum products.

4.5.1 Number of safety measures and rate of supply

The study sort to determine how safety measures available at the depot contributed to the rate of supply of petroleum products.

Table 4.15: No of safety measures and rate of supply

The number of safety cases reported at the Eldoret Depot determines the rate of supply of petroleum products at those specific periods.					
	Frequency	Percent	Cumulative Percent	Mean	Std.
Strongly agree	19	21.8	21.8	3.2874	4.7223
Agree	19	21.8	43.7		
Undecided	31	35.6	79.3		
Disagree	14	16.1	95.4		
Strongly disagree	4	4.6	100.0		
Total	87	100.0			

Table 4.15 shows that 21.8% (19) strongly agreed that the number of safety cases reported determined the rate of supply of petroleum products within the depot, 21.8% (19) agreed to this augment while 16.1% (14) disagreed, 4.6% (4) strongly disagreed while 35.6% (31) were undecided. The findings showed that the more the number of safety cases reported more measures are to be taken thus affecting the rate of supply of petroleum products within the depot as results from descriptive results (M=3.2874 and Std. = 4.7223) . According to Harvard Business Review, 2009 reported that with increased number of cases reported by consumers, the ability of them associating with the product decline thus causing a stream of decreased loyalty from the major users of the product if the necessary measures are not enacted promptly.

4.5.2 Level of safety and product supply

The study sort to determine how the level of safety within the depot contributed to product supply

Table 4.16: Level of safety and product supply

The levels of safety cases reported at the Eldoret Depot affects the capacity of petroleum product supply/ throughput at the affected times/periods.					
	Frequency	Percent	Cumulative Percent	Mean	Std.
Strongly agree	23	26.4	26.4	2.7011	1.3735
Agree	17	19.5	46.0		
Undecided	22	25.3	71.3		
Disagree	13	14.9	86.2		
Strongly disagree	12	13.8	100.0		
Total	87	100.0			

Table 4.16 shows that 26.4% (23) of the respondents strongly agreed and 19.5% (17) agreed that levels of safety cases reported at the depot affected the capacity of petroleum product supply/throughput and the different times; this was in opposite to 14.9% (13) who disagreed and 13.8% (12) who strongly disagreed while 25.3% (22) who were undecided. From the findings, it was seen that 46.0% of the respondents who constituted a descriptive results of (M=2.7011 and Std = 1.3735) retaliated that the levels of safety cases reported played a role in the capacity of petroleum products distributed at different times within the depot. According to Majtan and Dubcova 2008 ascertain that Implied and expressed claims of product safety refer to the degree of risk associated with using of product. Since the use of virtually any product involves some degree of risk, question of safety is essentially question of acceptable known levels of risks. That is a product is safe if its attendant risks are known and judged to be “acceptable” or “reasonable” by the buyer in view of benefits the buyer expects to derive from using the product.

4.5.3 Product authenticity and product turnaround time

The study sort to establish effects of product authenticity of petroleum products on product turnaround time at the depot.

Table 4.17: Product authenticity and product turnaround time

Petroleum product authenticity at the Eldoret Depot influences the product turnaround time thus the supply and demand of the products.					
	Frequency	Percent	Cumulative Percent	Mean	Std.
Strongly agree	16	18.4	18.4	2.2299	0.8853
Agree	43	49.4	67.8		
Undecided	22	25.3	93.1		
Disagree	4	4.6	97.7		
Strongly disagree	2	2.3	100.0		
Total	87	100.0			

From table 4.17, 18.4% (16) of the respondents strongly agreed and 49.4% (43) agreed that petroleum products authenticity at the depot contributed to turnaround time of other products, this was in contrary to 2.3% (2) and 4.6% (4) who disagreed and strongly disagreed while 25.3% (22) were undecided. The findings concluded that product authenticity at the depot played a key role in determining the product turnaround time of other petroleum products as supported by majority of the respondents (M= 2.2299 and Std. = 0.8853). According to Liao and Ma, 2015, product authenticity has contributed to consumers enjoying the benefits of convenience and availability of products produced in a standardized production process; however when consumers notice the gap between actual and desired pleasure when they consume products, it causes consumers feel that their fantasy is unfulfilled. They then switch from one product to another in search of the intended pleasure.

4.5.4 Quality supply policies and quality products

The study opted to determine how quality product policies influenced the quality of products distributed to clients at the depot.

Table 4.18: Quality supply policies and quality products

The supply of petroleum products at the Eldoret Depot is affected by the quality of the products to its consumers which affects the supply capacities					
	Frequency	Percent	Cumulative Percent	Mean	Std.
Strongly agree	25	28.7	28.7	2.3563	1.1511
Agree	26	29.9	58.6		
Undecided	18	20.7	79.3		
Disagree	16	18.4	97.7		
Strongly disagree	2	2.3	100.0		
Total	87	100.0			

Table 4.18 shows that 28.7% (25) of the respondents strongly agreed, 29.9% (26) agreed that quality of products at the depot affected supply capacity of the products, 20.7% (18) were undecided, 18.4% (16) disagreed with this, supported by 2.3% (2) who strongly disagreed to this. From the findings, quality of petroleum products played a key role in its supply with the depot markets. Manghani, 2011 stated that high levels of quality were essential to achieve business objectives and a basic requirement; source of competitive advantage, should remain a hallmark of Company products and services. From descriptive results (M = 2.3563 and Std. 1.1511) of the respondent were in favor of these sediments. Quality does not only relate solely to the end products and services a Company provides but also relates to the way the Company employees do their job and the work processes they follow to produce products or services. Quality control is focused on fulfilling quality requirements, and as related to clinical trials, it encompasses the operational techniques and activities undertaken within the quality assurance system to verify that the requirements for quality of the trial-related activities have been fulfilled.

4.5.5 Laws and quality products

The study sort to determine how quality laws adapted by KPC Eldoret depot contributed to supply of quality products to customers.

Table 4.19: Laws and quality products

The laws adopted by the Kenya Pipeline Eldoret Depot determines the quality of petroleum products available to its customers which results in inspections to determine quality thus affects the supply of the products.					
	Frequency	Percent	Cumulative Percent	Mean	Std.
Strongly agree	13	14.9	14.9	2.4253	0.9355
Agree	38	43.7	58.6		
Undecided	22	25.3	83.9		
Disagree	14	16.1	100.0		
Total	87	100.0			

Table 4.19 shows that 14.9% (13) of the respondents strongly agreed that laws adopted by KPC determined the quality of petroleum products available for supply, this was seconded by 43.7% (38) agreed while 25.3% (22) were undecided to this and 16.1% (14) disagreed with this. The findings proved that laws adopted by the company to manage quality are useful thus control and maintain quality products that are then distributed to the customers as agreed by majority of the respondents with descriptive results of (M=2.4253 and Std. = 0.9355). According to NPA, 2010, they outline laws on quality control of petroleum products that are; securing merchantable quality of petroleum products for protecting consumer benefits; Gasoline distributors' obligations to register themselves and analyze gasoline quality; Supply of products which do not conform to the mandatory quality standards is prohibited among other laws that protect the consumers and distributors of this products.

4.5.6 Consumer satisfaction and quality of products

The study sort to establish how quality products contributed to consumer satisfaction from the products distributed by the company.

Table 4.19: Consumer satisfaction and quality of products

At the Kenya Pipeline Eldoret Depot, consumer satisfaction is key thus formulation of necessary regulations that protect them from an authenticated products resulting in turnaround time efficiency.					
	Frequency	Percent	Cumulative Percent	Mean	Std.
Strongly agree	44	50.6	50.6	1.7126	0.9138
Agree	30	34.5	85.1		
Undecided	9	10.3	95.4		
Disagree	2	2.3	97.7		
Strongly disagree	2	2.3	100.0		
Total	87	100.0			

From table 4.19 the results show that 50.6% (44) of the respondents strongly agreed, 34.5% (30) agreed that regulations formulated to achieve customer satisfaction had assisted in alienating counterfeit products from the market resulting in turnaround and efficiency, this was disputed by 2.3% (2) and 2.3% (2) who disagreed and strongly disagreed to this while 10.3% (9) were undecided. The findings showed that when better legislations are made then consumers are protected from frail goods thus quality is maintained and managed. This was supported by majority of the respondents (M=1.7126 and Std. = 0.9138) as obtained through descriptive results. Atiyah, 2016 attributes consumer satisfaction as a prioritized strategic working tool that has a positive impact on the company's profit. It is also the foundation of every successful work, since customer satisfaction leads to repurchasing customer loyalty for the trademark, and sharing positive feedback with other people to buy the product presented for the customer has a positive impact thus, the organization gets the customer trust there is a close relation between service quality and the rate at which customers return to the company.

4.6 Quality control and management of petroleum products

The research study sort to determine how quality control within the KPC Eldoret depot had contributed to better petroleum product supply.

4.6.1 Facilities and ISO standards

The study sort to establish whether the available facilities within the Eldoret depot conformed to the set ISO standards.

Table 4.20: Facilities and ISO standards

All facilities at Kenya Pipeline at the Eldoret Depot are constructed and maintained in accordance to international standards(ISO 9001:2008)					
	Frequency	Percent	Cumulative Percent	Mean	Std.
Strongly agree	35	40.2	40.2	1.9770	0.9880
Agree	27	31.0	71.3		
Undecided	17	19.5	90.8		
Disagree	8	9.2	100.0		
Total	87	100.0			

Table 4.20 shows that 40.2% (35) of the respondents strongly agreed, 31.0% (27) agreed that the facilities at the depot were in line with ISO standards; however, 9.2% (8) of the respondents disagreed with this statement while 19.5% (17) were undecided. From the findings, it was evident that KPC Eldoret depot had maintained its structures and facilities within the ISO standards ensuring quality products are distributed to its customers. According to KPC annual report of 2012, the company had resulted in construction of ultramodern facilities to conform to international standards, especially in relation to personnel, customer, environmental and user equipment safety, through both built-in designs, the integrity of equipment, and strict operational codes. This was supported by descriptive results (M=1.9770 and Std. = 0.9880) as most of the respondents agreed to this argument.

4.6.2 Berthing, discharging and ISO standards

The study sort to determine the relationship between berthing and discharging of oil products and compliance with ISO standards.

Table 4.21: Berthing and discharging and ISO standards

Berthing and discharging of oil tankers are done in conformity to international standards in adhering to safety and stock accounting (ISO 9001:2008)					
	Frequency	Percent	Cumulative Percent	Mean	Std.
Strongly agree	21	24.1	24.1		
Agree	39	44.8	69.0	2.1264	0.8464
Undecided	22	25.3	94.3		
Disagree	5	5.7	100.0		
Total	87	100.0			

From table 4.21, 24.1% (21) of the respondents strongly agreed, 44.8% (39) agreed that berthing and discharging of petroleum products at the depot complied with ISO standards set and safety adherence, in contrary 5.7% (5) of the respondents disagreed while 25.3% (22) were undecided. The findings showed that the depot had a higher rate of ISO standard compliance with regards to berthing and discharging of oil tankers thus ensuring accountability of the petroleum products being distributed. From the findings majority of the respondents (M=2.1264 and Std. = 0.8464) as shown from descriptive results agreed with this statement. IDGCA, 2015 provide operational advice to assist personnel directly involved in tanker and terminal operations of day-to-day running of the depot, and that the terminal management should ensure that its concern for safe operating practices is known to the terminal personnel. It should be borne in mind that in all cases the advice in the guide is subject to any local or national terminal regulations that may be applicable, and those concerned should ensure that they are aware of any such requirements.

4.6.3 Recertification and testing of fuels and laboratories

The study sort to establish how recertification of the various qualities of petroleum products within the depot was done and independence of laboratories conducting this quality checks.

Table 4.22: Recertification and testing of fuels and laboratories

Recertification and testing of fuels are done at laboratories which are independent and has effects on the duration of supply.					
	Frequency	Percent	Cumulative Percent	Mean	Std.
Strongly agree	30	34.5	34.5	1.8851	0.7537
Agree	37	42.5	77.0		
Undecided	20	23.0	100.0		
Total	87	100.0			

Table 4.22 shows that 34.5% (30) of the respondents strongly agreed and 42.5% (37) agreed that the depot was conducting recertification and testing of petroleum products in its laboratories which were independent from any form of influence and this had effects on the duration of which the petroleum products were made ready for supply. 23.0% (20) of the respondents were undecided. The findings showed that recertification and testing were major processes that determined the quality of petroleum products that were made available to the clients as seen by descriptive findings (M=1.8851 and Std. = 0.7537). According to KPC 2014, Re-certification testing is done on petroleum products at the receiving stations before issuing the products back to the oil marketing companies. KPC participates in Inter-laboratory Cross Check program on testing of Jet A-1 coordinated by ASTM to benchmark with other laboratories across the world. In its effort to exceed customer requirements, the Quality Control section is preparing for compliance to ISO/IEC 17025 standard requirements and later will seek accreditation to the standard to enhance quality assurance of petroleum products.

4.6.4 Supply and quality control

The study sort to establish how supply of petroleum products was affected by quality control mechanisms at the depot.

Table 4.23: Supply and quality control

Kenya Pipeline Company Eldoret Depot ensures that petroleum products supplied to its customers are of high standards that has effects on throughput of the various products available

	Frequency	Percent	Cumulative Percent	Mean	Std.
Strongly agree	39	44.8	44.8	1.6782	0.7233
Agree	39	44.8	89.7		
Undecided	7	8.0	97.7		
Disagree	2	2.3	100.0		
Total	87	100.0			

From table 4.23, 44.8% (39) of the respondents strongly agreed, 44.8% (39) agreed that the depot had quality control mechanisms that determined the kind of quality needed to be supplied to consumers thus had effects on throughput, 2.3% (2) disagreed with this while 8.0% (7) were undecided. The findings show that quality control was a major player on fulfilling customer satisfaction at the depot thus need for such measures to ensure better products are distributed to the consumers. This statement was supported by majority of the respondents as defined by the descriptive results (M=1.6782 and Std. = 0.7233). Chang 2009 ascertained that in the current buyer's market with global hard competition, enterprises cannot respond rapidly to the customers' demand through traditional operation mechanism. Thereupon, a kind of new operation mechanism, i.e. supply chain management, emerges as the times require. In supply chain circumstance, the majority of enterprises, especially some excellent enterprises, rely on their suppliers more and more heavily. The product quality and manufacturing process of suppliers has great effect on the quality of final product of core enterprise. It means that the emphasis of research and practice of TQM has transferred from enterprise focus to supply chain focus. Not only the high quality of product and service but also the high level of quality control of the whole supply chain system ensures the competition advance. The essence of competition advantages are not pursuing product quality and process quality simply, but the performance of the whole supply chain system. Therefore, the establishment of quality management system of

supply chain based on the management ideas of ISO9000 will promote the involvement of all the members and facilitate the implement of quality control of the whole supply chain system.

4.6.5 Quality of petroleum transportation assurance

The study sort to determine how the transportation of petroleum products within the pipeline was done to ensure quality.

Table 4.24: Quality of petroleum transportation assurance

Kenya pipeline company guarantees quality of all products transported through the pipeline					
	Frequency	Percent	Cumulative Percent	Mean	Std.
Strongly agree	43	49.4	49.4	1.5977	0.6898
Agree	38	43.7	93.1		
Undecided	4	4.6	97.7		
Disagree	2	2.3	100.0		
Total	87	100.0			

Table 4.24 shows that 49.4% (43) of the respondents strongly agreed that there were mechanisms deployed to ensure the transported petroleum products within the pipeline maintained the high-quality properties that they are supposed to have, this was also agreed on by 43.7% (38) of the respondents while 2.3% (2) disagreed and 4.6% (4) were undecided. Matiti (2012) states that due to the various transportation problems KPC faced, it had to change its operating environment of forcing it to adopt several strategies so as to overcome these challenges and ensure optimum operation where there are sufficient products at any one given time in a given depot. In order to achieve this, the Company has adopted some responsive strategies that will limit the effects of such challenges. The descriptive analysis (M=1.5977 and Std. = 0.6898) concluded that the company guaranteed its consumers quality availed to them for usage.

4.6.6 Quality staff and management of petroleum products

The study sort to determine if the depot had qualified staff to handle the petroleum products and maintain its quality.

Table 4.25: Quality of staff and supply of petroleum products

Kenya Pipeline Company has qualified staff in the quality control section who carry out quality analysis of petroleum products					
	Frequency	Percent	Cumulative Percent	Mean	Std.
Strongly agree	29	33.3	33.3	2.0460	0.9989
Agree	34	39.1	72.4		
Undecided	18	20.7	93.1		
Disagree	3	3.4	96.6		
Strongly disagree	3	3.4	100.0		
Total	87	100.0			

Table 4.25 shows that 33.3% (29) of the respondents strongly agreed, 39.1% (34) agreed that the depot had adequate number of qualified staff to handle quality related issues that arose due to the petroleum products, however, 3.4% (3) disagreed to this, 3.4% (3) strongly disagreed while 20.7% (18) were undecided. The findings proved that the company had qualified staff who maintained the quality standard required thus ensuring that their clients received the best products all the time. This showed that majority of the respondents were in favor of this as shown from descriptive results (M=2.0460 and Std. = 0.9989) A quality system is defined as the organizational structure, responsibilities, processes, procedures and resources for implementing quality management. Quality management includes those aspects of the overall management function that determine and implement the Company quality policy and quality objectives. Both quality control and quality assurance are part of quality management (Manghani, 2011).

4.6.7 Quality control laboratories and delivery points.

The study sort to know whether all depots had quality control inspection points and delivery points to make sure that the products remained in their normal state.

Table 4.26: Quality control laboratories and delivery points

Kenya Pipeline Company has its own Quality Control laboratories at entry and delivery points.					
	Frequency	Percent	Cumulative Percent	Mean	Std.
Strongly agree	29	33.3	33.3	1.8736	0.7595
Agree	42	48.3	81.6		
Undecided	14	16.1	97.7		
Disagree	2	2.3	100.0		
Total	87	100.0			

Table 4.26 shows that 33.3% (29) and 48.3% (42) of the respondents strongly agreed and agreed that there were quality control laboratories at every entry point to ensure that quality was achieved at each point thus no alteration of these products along the transportation channels, 2.3% (2) disagreed while 16.1% (14) were undecided. From the descriptive findings it was seen that majority of the participants in the study (M=1.8736 and Std. = 0.7595) agreed to this statement. According to ERC report of 2011, the company had started that it has its own Quality Control laboratories at entry and delivery points, and has also constructed an ultra-modern laboratory at Mombasa, which has been contracted to an independent operator to achieve the desired independence. The laboratories use international (American Society for Testing & Materials (ASTM) and (Institute of Petroleum (IP) standards in testing the products for different quality characteristics.

4.6.8 Compliance of international standards

The study sort to establish compliance to international quality standards that were designed for the petroleum production and supply industry.

Table 4.27: Compliance of international standards

Kenya Pipeline Company ensures that all its operations must comply with international standards (ISO 9001:2008)					
	Frequency	Percent	Cumulative Percent	Mean	Std.
Strongly agree	36	41.4	41.4	1.8161	0.7855
Agree	31	35.6	77.0		
Undecided	20	23.0	100.0		
Total	87	100.0			

Table 4.27 shows that 41.4% (36) of the respondents strongly agreed that the depot complied with ISO standards that ensured quality was maintained, this was in agreement by 35.6% (31) of the respondents while 23.0% (20) were undecided. This showed that majority of the respondents from descriptive results (M=1.8161 and Std. = 0.7855) agreed with this statement. According to KPC annual report of 2011 the company had complied with the set qualifications that included; ability to consistently provide product that meets customer and applicable statutory and regulatory requirements, and aims to enhance customer satisfaction through the effective application of the system, including processes for continual improvement of the system and the assurance of conformity to customer and applicable statutory and regulatory requirements.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS, RECOMMENDATIONS AND DISCUSSIONS

5.1 Introduction

This chapter gives a summary of the research findings as analyzed in the previous chapter. It shows the conclusions as per the research questions and also the researcher's recommendations. It was also suggesting the areas for further research.

5.2 Summary of findings.

The following represents the summary of the findings of the research topic influence of fuel supply function on the management of petroleum products in Kenya: a case of Kenya Pipeline Company, Eldoret depot. The summary has been made in accordance with the objectives of the study.

5.2.1 To establish the influence of storage capacity on the supply of petroleum products by Kenya Pipeline Company

The study concluded that Kenya Pipeline Company Eldoret Depot experienced the challenge of storing various petroleum products at the same time due to limited storage capacity. This was a challenge that affected also the availability of other petroleum products at the depot. Studies that have been conducted by various scholars suggest that due to the presence of storage facilities within various points of supply it becomes difficult to stock other products at that specific interval as if the product available at that time is not consumed quickly then the other products cannot be made available to the suppliers. This was in support of Coyle, Bardi & Langley Jr, (2003), who advised that product availability was determined by the number and location of warehouses because it determined the number of customers close to the warehouse. Facilities with mass production were responsive to supply variability while customization platforms were prone to longer production lead times. The availability of these storage facilities contributed or hard effects on the lead time, throughput and turnaround time at the depot has only one product was supplied at that specific time. Further, Anyanzwa, 2008, The National Oil Corporation of Kenya was charged in April 2008 with maintaining strategic stocks equivalent to 30 days of

consumption and eventually to reach 90 days over the coming years. Just as large storage capacity can be a measure in mitigating the effects of shortages of petroleum products in the market, it is incumbent on governments not to unnecessarily intervene in fuel price adjustment as this can encourage hoarding of the commodity by dealers resulting in artificial shortages. Wide price disparities in our neighboring countries can also lead to smuggling, thus causing shortages.

5.2.2 To determine the influence of pipeline infrastructure on the supply of petroleum products by Kenya Pipeline Company

Infrastructure is one of the key components of any successful project. Pipeline infrastructure was one of the key factors that contributed to effective management of petroleum products within the depot. The study findings suggested that despite these facilities being available they needed to be enhanced and expanded has they were not sufficient enough to handle the various products being availed to the depot. This is in support of various studies that site that due to considerably high levels of efficiency attained when the demand is enough to sustain high utilization of pipeline services, pipeline transport is hence competitive in comparison to other means of transport (Sexmith, 2010), This was in relevance to Allegro Energy Group (2001) who atasted that delivery line worked in group mode resulting the shipper in getting the exact amount of petroleum product for shipping. The pipelines that transport the products are systems that are used to deliver refined petroleum products to the seaports from the refineries and to the market points. The products are often taken to retail outlets and wholesalers using trucks. The systems for refined products works converse to crude-oil gathering systems.

5.2.3 To establish the influence of regulations on the supply of petroleum products by Kenya Pipeline Company

The need for regulation to govern the production, transportation and supply of the petroleum products was a key concern that needed insight and how it affected the management of the petroleum products within the depot. The study found out that regulations played a key role in ensuring the quality of products provided to consumers were of the required standards, working environment safety was a key concern that the depot had worked tireless to ensure it was the top notch, consumer satisfaction had been contributed by the enforcement of this regulations. According to Lin & Sheu (2012) supported the need of regulations by indicating that the petroleum industry over the years continued to face a myriad of hurdles such as political risks, unfavorable and strict government regulations, stiff competition and the threat of new and

emergent entrants which affects the pricing and demand/supply of petroleum products. It is worth noting that the availability of petroleum products is not the main challenge facing the industry but rather putting the oil reserves into processing and ensuring that the products get to the final consumers at a lower cost without tempering with its quality thus need of these regulations. This implies that without regulations in the petroleum sector consumers will receive a raw deal thus compromised goods will be sold to them.

5.2.4 To determine the role of quality control on the supply of petroleum products by Kenya Pipeline Company

Quality of products determines its consumption within its target market. When a product in good more consumers would prefer associating themselves with the product. Due to previous encounters within the market and customer complains about alteration of petroleum products, quality control has been stepped up to encounter all this problem thus streamlining the loop holes that contributed to this vice. The study findings concluded that quality control measures had been stepped up at the depot, facilities available at the depot complied with ISO standards, products availed at the depot were subjected to other test to ensure consistency with the set standards, staff who were engaged were qualified in the quality management filed and that the depot complied with international quality standards for those products that were for exportation. This was in line with Lagrosen (2010) who said that quality control was aimed at emphasizing the need for the adherence to international agreements on prevention and reduction of water pollution as result of fuel oil. Balasubramanian (2010) also perceived that quality control of petroleum products had been successful especially petrol, kerosene and diesel had been key in the improvement of the listed areas. To enable oil transportation companies to deliver fuel oil to exacting specifications, quality control was the next item on the agenda that needed full development and implementation.

5.3 Conclusion of the study

From the findings, the study concludes that batch size; frequency of receipt, evacuation rate influenced the supply of petroleum products by affecting its turnaround time, throughput and lead time. Therefore, with increased batch size at the depot will contribute to more different products being availed to the depot at once and simultaneously, increased frequency of petroleum products supply, increased rate of return will be experienced, requisition of other petroleum products will be made. This will improve the target market increasing profitability and consumer intake and supply. With improved infrastructure at the depot and increased loading space there will be increased number on the lorries loaded at one instant, with enough storage capacity more petroleum products will be available reducing the lead time of other petroleum products and throughput within the depot. Regulations should be followed to ensure safety of employees, products made available to consumers should conform to the laid specifications, procedures for handling these products followed and supply channels well established on those responsible for regulation compliance held accountable in case of breach. The quality of products made available to the customers should be of better quality thus their satisfaction. The study concluded that the company was compliant with ISO standards thus certified as ISO 9001:2008.

5.4 Contributions to the body of knowledge

Table 5.1: Contributions to the body of knowledge

Objectives	Contribution to knowledge
To establish the influence of storage capacity on the supply of petroleum products by Kenya Pipeline Company	Despite there being sufficient storage tanks, additional capacity should be enhanced to ensure there are enough products at all times.
To determine the influence of pipeline infrastructure on the supply of petroleum products by Kenya Pipeline Company	The current infrastructure was designed many years ago. Demand has increased to almost triple hence need to re-design the existing infrastructure to accommodate the ever increasing growth in the industry.
To establish the influence of regulations on the supply of petroleum products by Kenya Pipeline Company	Petroleum industry has been faced by ever changing regulations since the formation of ERC. These regulations have positively and negatively impacted on the management of petroleum products. ERC should always seek to engage all the stakeholders to ensure these regulations are properly and smoothly implemented.
To determine the role of quality control on the supply of petroleum products by Kenya Pipeline Company	Quality of petroleum products is the most important aspect. Quality is determined through re certification ones these products are received at the depot to ensure they meet set requirements. Strict measures should be put in place to ensure customer receives quality products by ensuring adulteration does not take place between the depot and the customer.

5.5 Recommendations

The researcher recommends that;

1. The Kenya Pipeline Company Eldoret Depot should increase its truck holding capacity to enhance more trucks to be loaded thus contributing to increased product evacuation,
2. Kenya Pipeline Company Eldoret Depot should increase its storage capacity due to the high demand of petroleum products for both the local and export markets,
3. The company should reduce the beauractic methods of operation and truck clearance to increase efficiency, effective and timely evacuation of available petroleum products,
4. The company should improve its quality control mechanisms to ensure quality products are supplied to its consumers.

5.5 Suggestions for further studies

The researcher recommends that more studies should be done on the remaining KPC depots (Nakuru, Nairobi, Kisumu and Mombasa). This will provide insight on these issues on a broad spectrum. Research studies should also be done use of ICT related systems and on the effects on supply chain management.

REFERENCES

Abrell, J. (2010). Regulating CO 2 emissions of transportation in Europe: a CGE-analysis using market-based instruments. *Transportation Research Part D: Transport and Environment*, *15*(4), 235-239.

Achieng', E. & Rotich, G. (2013). Factors affecting effective supply of petroleum products in Kenya: A case of Kenya Pipeline Company (KPC). *International Journal of Social Sciences and Entrepreneurship, 1* (7), 579-600.

Allegro Energy Group. 2001. *How pipelines make the oil market work – Their networks, operation and regulation*. A memorandum prepared for the Association of Oil Pipe Linesand the American Petroleum Institute's Pipeline Committee. Available from: http://www. aopl.org/about/pipelines.html

Alley, I., Asekomeh, A., Mobolaji, H., & Adeniran, Y. A. (2014). *Oil price shocks and Nigerian economic growth*. European Scientific Journal, ESJ, 10(19).

Amit, S., & Jean, L. J. (2005). Organizational Capabilities in E-Commerce: An Empirical Investigation of E-Brokerage Service Providers. *Journal of the Academy of Marketing Science*, *33*(3), 360-375.

An, H., Wilhelm, W. E., & Searcy, S. W. (2011). Biofuel and petroleum-based fuel supply chain research: a literature review. *Biomass and Bioenergy*, *35*(9), 3763-3774.

Azevedo, S.G., Carvalho, H., & Machado, V.C.(2011). The influence of green practices on supply chain performance: A case study approach.*Transportation Research Part E: Logistics and TransportationReview*, *47*(6), 850-871.

Balasubramanian, K. (2010). Supply chain management in oil downstream supply business: a perspective on IT Alternative and issues. Vol. *27* (4), 436-455.

Bowersox, D., Closs, D., and Cooper, M. (2010), Supply Chain Logistics Management (International Edition), McGraw-Hill, New York.

Chima, A. (2007).Supply chain management issues in the oil and gas industry, *Journal of Business and Economics Research, Vol*.5, No.6, pp 27-36.

Coyle, J.J., Bardi, E.J. & Langley Jr., C.J. (2003) *The management of business logistics: supply chain perspective*. 7th edition. Mason: South-Western.

Fahimnia, B., Farahani, R. Z., Marian, R., & Luong, L. (2013). A review and critique on integrated production–supply planning models and techniques. *Journal of Manufacturing Systems*, *32*(1), 1-19.

Foster, S.T., Wallin, C., & Ogden, J.(2011). Towards a better understanding of supply chain quality management practices. *International Journal of Production Research*, 49(8), 2285 - 2300.

Frohlich, M.T. & Westbrook, R. (2002). 'Demand chain management in manufacturing and services: web based integration, drivers and performance', *Journal of Operations Management*, 20(6), 729-745.

Gist, D. (2013). The impact of the oil industry on economic growth performance in Nigeria. Retrieved fromttp://www.doublegist.com/economic -growth-nigeria-impact –oil – industry

HARVARD BUSINESS REVIEW, H. (2009). *A Strategic Approach to Managing Product Recalls*. [online] Harvard Business Review. Available at: https://hbr.org/1996/09/a-strategic-approach-to-managing-product-recalls [Accessed 15 Oct. 2017].

Hirai, H., Matsuo, Y., & Nagatomi, Y. (2008). Supply and demand analysis on petroleum products and crude oil for Asia and the world. *IEEJ Energy J, 3*(3), 29-60.

IDGCA. (2015). *International Safety Guide for Oil Tankers and Terminals - IDGCA*. *Idgca.org*. Retrieved 16 October 2017, from http://www.idgca.org/

Ikram, A. (2004). *Supply chain management in the oil and gas sector*: Supply Chain Update.

ISPRL (Indian Strategic Petroleum Reserves Limited) (2009). *Homepage. www.isprlindia. com/aboutus.html.*

Kanter, R. (2003). The Change Master. NY: Simon and Schuster Company.

Kimani, C. W. (2013). Supply Chain Management Challenges in Kenya Petroleum Industry: Case of National Oil Corporation of Kenya, *International Journal of Social Sciences and Entrepreneurship***,** 1 (3), 231-246.

Kojima, M. Mathews, W. and Sexmith, F. (2010*). Petroleum Markets in Sub- Saharan Africa*: An analysis of 12 Countries. Extractive Industries for Development Series 15.

Kothari, C.R (2004) *Research methodology; Methods and techniques.*New Delhi; New Age International (p) ltd publishers.

Lagrosen, S. (2010). Strengthening the weakest link of TQM from customer focus to customer understanding, The TQM Magazine, 13(5), 348-54.

Liao, S., & Ma, Y. Y. (2015). Conceptualizing consumer need for product authenticity. *International Journal of Business and Information, 4*(1).

Lin, R.J., &Sheu, C. (2012). Why Do Firms Adopt/Implement Green Practices? An Institutional Int. J Sup. Chain. Mgt Vol. 3, No. 4, December 2014 62 Theory Perspective. Procedia - Social and behavioral Sciences, 57, 533-540.

Majtán, Š., & Dubcová, G. (2008). The Ethics in the Product Marketing. *Ekonomika a Management, 2008*(2).

Manghani, K. (2011). Quality assurance: Importance of systems and standard operating procedures. *Perspectives in clinical research, 2*(1), 34.

Matiti, C. M. (2012). Response Strategies Adopted By Kenya Pipeline Company Limited to the Challenges of Oil Supply In Kenya.

Mikati, N. (2010). Dependence of lead time on batch size studied by a system dynamics model. *International Journal of Production Research, 48*(18), 5523-5532.

Morton, R. (2003). *Good chemistry in the supply chain*. Logistics Today: 44, 10, 30.

Mugenda, M.O. &Mugenda, G.A (1999.). Research Methods: quantitative methods qualitative approaches.Nairobi: Act press

Mugenda, O. M., & Mugenda, A. G. (2003). *Research Methods Quantitative and Qualitative Approaches.* Nairobi: Applied Research and Training Services Press.

Neuman, W. L. (2000) Social Research Methods: Qualitative and Quantitative Approaches. Fourth Edition. Boston.

NPA (2010). *Quality Control of Petroleum Products in the Japanese Marketing System*. [Online] Pecj.or.jp. Available at: http://www.pecj.or.jp/japanese/overseas/conference/ [Accessed 16 Oct. 2017].

Olugu, E.U., & Wong, K.Y. (2012). An expert fuzzy rule-based system for closed-loop supply chain performance assessment in the automotive industry.Expert Systems with Applications, 39(1), 375-384.

Rocha-Lona, L., Alvarez-Reyes, S. E., Eldridge, S., Garza-Reyes, J. A., & Kumar, V. (2013). Lean six sigma supply chain case study: aircraft shipment improvement in a

pharmaceutical company. In *Advances in Sustainable and Competitive Manufacturing Systems* (pp. 1475-1487). Springer, Heidelberg.

Sakhuja, S., & Jain, V. (2012). Service Supply Chain: An Integrated Conceptual Framework. *CIE42 Proceedings*. 216 207.

Sandholm, L. (2000). Total Quality Management. IAQ Book Series, 11(1).

USDA (2012b). "*USDA Agricultural Projections to 2011*." _http://www.ers.usda.gov/ publications/oceusdaagricultural- projections/oce121.aspx.

APPENDICES

APPENDIX I: QUESTIONNAIRE

SECTION ONE: GENERAL INFORMATION

1. Position of the respondent (tick where appropriate)

Oil marketing manager (OMCs) ☐ Supply and planning officer ☐

Supply analyst ☐ loading superintendent ☐

Product accounting officer ☐

2. Level of formal education

Diploma ☐ Bachelor's degree ☐ MA/MSC/PhD ☐

3. For how long have you worked in your current position?

Less than 5 yrs. ☐ 5-10 yrs. ☐ Above 10 yrs. ☐

SECTION B: STORAGE CAPACITY

4. The statements below are concerned with the effect of storage capacity on the management of petroleum products by Kenya Pipeline Company. Tick appropriately using the following scale. **1-strongly agree, 2- agree, 3- neutral, 4-disagree and 5- strongly disagree.**

Statement	**1**	**2**	**3**	**4**	**5**
The batch size capacity within the Kenya pipeline Eldoret depot determines the lead time of petroleum products.					
Batch size supply determines turnaround times at which different products are received and distributed at the depot					
The frequency at which the supply of petroleum products at the Eldoret depot determines the through put of the products at different instances.					
The supply of petroleum products at a single instance at the Eldoret Depot determines the turn- around cycle of the petroleum products available for supply.					

The rate of supply of the petroleum products at the Eldoret Depot affects the turn-around time of different or similar products.					
The requisition of petroleum products within the supply chain determines the lead time of petroleum supply					

5. In your own view, what is the effect of storage capacity on the management of petroleum products at the Kenya Pipeline Eldoret depot?

……

……

SECTION C: PIPELINE INFRASTRUCTURE

6. The statements below are concerned with the influence of pipeline infrastructure on the management of petroleum products by Kenya Pipeline Company. Tick appropriately using the following scale. **1-strongly agree, 2- agree, 3- neutral, 4-disagree and 5- strongly disagree.**

Statement	**1**	**2**	**3**	**4**	**5**
Number of trucks loaded per day affects turnaround time of product clearance from the Eldoret depot.					
Number of trucks loaded per day contributes to high/low through put of products at the Eldoret depot.					
The company's capacity to hold enough petroleum products that has effects on the through put of the Eldoret Depot.					
The company's' capacity to accommodate different petroleum products and different instances contributes to the lead time of provision of other products at those times.					
The different petroleum products available at the depot have effects on the turnaround time of supply of the same or different products.					
The available petroleum products at the depot within specifics times affects how other petroleum products are availed to the depot with the same periods of time.					

7. In your own view, how does pipeline infrastructure influence management of petroleum products at Kenya Pipeline Eldoret depot?

……

……

SECTION D: REGULATIONS

8. The statements below are concerned with the influence of regulations on the management of petroleum products by Kenya Pipeline Company. Tick appropriately using the following scale.

1-strongly agree, 2- agree, 3- neutral, 4-disagree and 5- strongly disagree.

Statement	**1**	**2**	**3**	**4**	**5**
The number of safety cases reported at the Eldoret Depot determines the rate of supply of petroleum products at those specific periods.					
The levels of safety cases reported at the Eldoret Depot affects the capacity of petroleum product supply/ through put at the affected times/periods.					
Petroleum product authenticity at the Eldoret Depot influences the product turnaround time thus the supply and demand of the products.					
The supply of petroleum products at the Eldoret Depot is affected by the quality of the products to its consumers which affects the supply capacities					
The laws adopted by the Kenya Pipeline Eldoret Depot determines the quality of petroleum products available to it customers which results in inspections to determine quality thus affects the supply of the products.					
At the Kenya Pipeline Eldoret Depot consumer satisfaction is key thus formulation of necessary regulations that protect them from illegal products resulting in turnaround time efficiency.					

9. How do regulations affect the management of petroleum products at the Kenya Pipeline Company Eldoret depot?

……

……

SECTION E: QUALITY CONTROL

10. The statements below are concerned with the role of quality control on the management of petroleum products by Kenya Pipeline Company. Tick appropriately using the following scale. **1-strongly agree, 2- agree, 3- neutral, 4-disagree and 5- strongly disagree.**

Statement	**1**	**2**	**3**	**4**	**5**
All facilities at Kenya Pipeline at the Eldoret Depot are constructed and maintained in accordance to international standards(ISO 9001:2008)					
Berthing and discharging of oil tankers are done in conformity to international standards in adhering to safety and stock accounting (ISO 9001:2008)					
Recertification and testing of fuels are done at laboratories which are independent and has effects on the duration of supply.					
Kenya Pipeline Company Eldoret Depot ensures that petroleum products supplied to its customers are of high standards that have effects on through put of the various products available.					
Kenya pipeline company guarantees quality of all products transported through the pipeline					
Kenya Pipeline Company has qualified staff in the quality control section who carry out quality analysis of petroleum products					
Kenya Pipeline Company has its own Quality Control laboratories at entry and delivery points.					
Kenya Pipeline Company ensures that all its operations must comply with international standards (ISO 9001:2008)					

11. What is the role of quality control on the management of petroleum products by Kenya Pipeline Company Eldoret Depot?

……

……

American Scientific Research Journal for Engineering, Technology, and Sciences (ASRJETS)

http://asrjetsjournal.org/

Manuscript Information	
Manuscript Number (ID)	3510
Title	FACTORS INFLUENCING SUPPLY OF PETROLEUM PRODUCTS IN KENYA; A CASE OF KENYA PIPELINE COMPANY DEPOT, ELDORET, KENYA

Congratulations! The review process for the American Scientific Research Journal for Engineering, Technology, and Sciences (ASRJETS) (ISSN (Print) 2313-4410 & ISSN (Online) 2313-4402) has been completed. The journal during its journey which started in 2010 received submissions from 50 different countries and regions, which were reviewed by international experts.

Based on the recommendations of the reviewers and Based on the editorial board decision, we are pleased to inform you that your paper identified above has been accepted for publication in peer reviewed and indexed [Ulrich's, Massachusetts Institute of Technology (USA), Open Archives (Cornell University (USA)), Ulrich's Periodicals Directory, Simpson University (USA), IE Library (Spain), Tilburg University (The Netherlands), McGill University (Canada), INDIANA UNIVERSITY-PURDUE UNIVERSITY INDIANAPOLIS (USA), Indiana University East (campus library (USA)), University Of Arizona (USA), , OCLC World Cat, University Of Washington (USA), Biola University (USA), Northeastern University (USA), University of Louisville (USA), Pepperdine University Libraries (USA), Boston University (USA), Brandeis University (USA), Mblwhoi Library (USA), Tufts University (USA), University of Massachusetts Medical School (USA), University of Connecticut (USA), University of New Hampshire (USA), Wellesley College (USA), Boston Library Consortium(USA), Williams College (USA), University of Massachusetts Lowell Libraries (USA), Healey Library at the University of Massachusetts Boston (USA), Antioch University Libraries (USA), University of New Brunswick Libraries (Canada), Mount Allison University (Canada), Canadian University College Library (Canada), University Library of Skövde (Sweden), Roderic Bowen Library and Archives (United Kingdom), University of Wales Trinity Saint David (United Kingdom), Mount Saint Vincent University Library (Halifax, Nova Scotia Canada), Biblioteca Universitaria de León (Spain), Bibliotecas Universidad de Salamanca (Spain), Vniversidad DSalamanca (Spain), Researchbib, docstoc, scribd, ectel07, ProLearnAcademy, slideshare, mendeley, Issuu, academia, Internet archive, Academic research (ourGlocal), OAIster database.] American Scientific Research Journal for Engineering, Technology, and Sciences (ASRJETS) ISSN (Print) 2313-4410 & ISSN (Online) 2313-4402. The acceptance decision was based on the internal and external reviewers' evaluation after internal and external double blind peer review and chief editor's approval.

Finally, we would like to further extend our congratulations to you.
Yours sincerely,
ASRJETS editorial board

This document contains the following information (kindly read them carefully):

1- Internal and External Evaluation Results.
2- Detailed Publication Instructions.

1- Internal and External Evaluation Results.

Note: This paper was evaluated based on two stages; the first stage is the internal evaluation, the second stage is the external peer reviewed evaluation. The following results\ remarks are taken from the original reviewers results.

Reviewers Results: Internal and External Results

PART A: ***Editorial Office Only***

SECTION I: Internal Evaluation Results

Manuscript information	**Yes**	**No**
Is the research within to the scope of the journal?	**X**	
Is it a full paper submission?	**X**	
Is the language of paper English?	**X**	
Will the paper be of interest to its audience?	**X**	
Has the paper or part of it already been published elsewhere? [Based on Google Search on tile and abstract]		**X**
Recommendations: Mark where appropriate.		
Rejected After Internal Review		
Accepted After Internal Review and Recommended for External Technical Review	**X**	

PART B: *Reviewers Only*

SECTION II: External Evaluation Results

Mark (X) where appropriate	YES	NO
Are the references authoritative and representative?	X	
Is the paper interesting or relevant for an international audience?	X	
Does the title accurately reflect the content?	X	
Is there valuable connection to previously published research in this area?	X	
Is the abstract sufficiently concise and informative?	X	
Do the keywords provide adequate index entries for this paper?	X	
Is the purpose of the paper clearly stated in the introduction?	X	
Does the paper achieve its declared purpose?	X	
Does the paper show clarity of presentation?	X	
Do the figures and tables aid the clarity of the paper?	X	
Are the English and syntax of the paper satisfactory?	X	
Is the paper concise? (If not, please indicate which parts might be cut?)	X	
Does the paper develop a logical argument or a theme?	X	
Do the conclusions sensibly follow from the work that is reported?	X	
Is the Technical Quality suitable for publication?	X	
Does the paper provide suitable Contribution To The Field?	X	
Is the overall quality suitable for inclusion in this journal?	X	

SECTION III - Recommendations: (*Kindly Mark With An X*)

Accept As Is:	
Requires Minor Corrections:	X
Requires Moderate Revision:	
Requires Major Revision:	
Submit To Another Publication Such As:	
Reject On Grounds Of (Please Be Specific):	

SECTION IV: Additional Comments

Please add any additional comments (Including comments/suggestions regarding the submission, if any):

Constraints \limitations of the study are not well defined.
"Recommendations" should be added as a separate title at the end of the paper.

American Scientific Research Journal for Engineering, Technology, and Sciences (ASRJETS)
http://asrjetsjournal.org/

ASRJETS COPYRIGHT FORM

To ensure uniformity of treatment among all contributors, other forms may not be substituted for this form, nor may any wording of the form be changed. This form is intended for original material submitted to ASRJETS and must accompany any such material in order to be published by ASRJETS. Please read the form carefully.

TITLE OF PAPER INCLUDING ALL CONTENT IN ANY FORM, FORMAT, OR MEDIA (hereinafter,

FACTORS INFLUENCING SUPPLY OF PETROLEUM PRODUCTS IN KENYA; A CASE OF KENYA PIPELINE COMPANY DEPOT, ELDORET, KENYA

COMPLETE LIST OF AUTHORS:

Peter Ndegwa Gicharu [a]*, Yona Sakaja Mang'usho [b]

COPYRIGHT TRANSFER

The undersigned hereby assigns to the **Global Society of Scientific Research and Researchers (GSSRR)** and to the **American Scientific Research Journal for Engineering, Technology, and Sciences (ASRJETS)** ("ASRJETS ") all rights under copyright that may exist in and to the above Work, any revised or expanded derivative works submitted to ASRJETS by the undersigned based on the Work, and any associated written, audio and/or visual presentations or other enhancements accompanying the Work. The undersigned hereby warrants that the Work is original and that he/she is the author of the Work; to the extent the Work incorporates text passages, figures, data or other material from the works of others, the undersigned has obtained any necessary permission. **See Retained Rights, below.**

AUTHOR RESPONSIBILITIES

ASRJETS distributes its technical publications throughout the world and wants to ensure that the material submitted to its publications is properly available to the readership of those publications. Authors must ensure that The Work is their own and is original. It is the responsibility of the authors, not ASRJETS, to determine whether disclosure of their material requires the prior consent of other parties and, if so, to obtain it.

RETAINED RIGHTS/TERMS AND CONDITIONS

1. Authors/employers retain all proprietary rights in any process, procedure, or article of manufacture described in the Work.
2. Authors/employers may reproduce or authorize others to reproduce The Work and for the author's personal use or for company or organizational use, provided that the source and any ASRJETS copyright

notice are indicated, the copies are not used in any way that implies ASRJETS endorsement of a product or service of any employer, and the copies themselves are not offered for sale.

3. Authors/employers may make limited distribution of all or portions of the Work prior to publication if they inform ASRJETS in advance of the nature and extent of such limited distribution.

4. For all uses not covered by items 2 and 3, authors/employers must request permission from ASRJETS.

5. Although authors are permitted to re-use all or portions of the Work in other works, this does not include granting third-party requests for reprinting, republishing, or other types of re-use.

INFORMATION FOR AUTHORS

ASRJETS Copyright Ownership

It is the formal policy of ASRJETS to own the copyrights to all copyrightable material in its technical publications and to the individual contributions contained therein, in order to protect the interests of ASRJETS , its authors and their employers, and, at the same time, to facilitate the appropriate re-use of this material by others.

Author/Employer Rights

If you are employed and prepared the Work on a subject within the scope of your employment, the copyright in the Work belongs to your employer as a work-for-hire. In that case, ASRJETS assumes that when you sign this Form, you are authorized to do so by your employer and that your employer has consented to the transfer of copyright, to the representation and warranty of publication rights, and to all other terms and conditions of this Form. If such authorization and consent has not been given to you, an authorized representative of your employer should sign this Form as the Author.

Reprint/Republication Policy

ASRJETS requires that the consent of the first-named author and employer be sought as a condition to granting reprint or republication rights to others or for permitting use of a Work for promotion or marketing purposes.

GENERAL TERMS THAT ARE PART OF RETAINED RIGHTS/TERMS AND CONDITIONS

1. The undersigned represents that he/she has the power and authority to make and execute this assignment.

2. The undersigned agrees to indemnify and hold harmless ASRJETS from any damage or expense that may arise in the event of a breach of any of the warranties set forth above.

3. For jointly authored Works, all joint authors should sign, or one of the authors should sign as authorized agent for the others.

4. This journal and the Global Society of Scientific Research and Researchers (GSSRR) are permitted to republish the author paper in any other journals or books.

5. By submitting the publication fee, it is understood that the author has agreed to our terms and conditions which may change from time to time without any notice.

6. Before publishing, author must check whether this journal is accepted by his employer, or any authority he intends to submit his research work. We will not be responsible in this matter.

7. It should be clear for authors that the Editor In Chief is responsible for the final decision about the submitted papers. The Editor In Chief will send the paper for peer review to two reviewers, if the results were negative by one reviewer and positive by the other one; then the editor may send the paper for third reviewer or he take immediately the final decision by accepting\rejecting the paper. The Editor In Chief will ask the selected reviewers to present the results within 7 working days, if they were unable to complete the review within the agreed period then the editor have the right to resend the papers for new reviewers using the same procedure. If the Editor In Chief was not able to find suitable reviewers for certain papers then he have the right to accept\reject the paper.

8. If at any time, due to any legal reason, if the journal stops accepting manuscripts or could not publish already accepted manuscripts, we will have the right to cancel all or any one of the manuscripts without any compensation or returning back any kind of processing cost.

9. The cost covered in the publication fees is only for online publication of a single manuscript.

27/10/2017

Author/Authorized Agent for Joint Authors **Date (----------**

PLEASE DIRECT ALL QUESTIONS ABOUT THIS FORM TO:

The Managing Editor

editor@asrjetsjournal.org

American Scientific Research Journal for Engineering, Technology, and Sciences (ASRJETS)
http://asrjetsjournal.org/

ASRJETS COPYRIGHT FORM

To ensure uniformity of treatment among all contributors, other forms may not be substituted for this form, nor may any wording of the form be changed. This form is intended for original material submitted to ASRJETS and must accompany any such material in order to be published by ASRJETS. Please read the form carefully.

TITLE OF PAPER INCLUDING ALL CONTENT IN ANY FORM, FORMAT, OR MEDIA (hereinafter,

FACTORS INFLUENCING SUPPLY OF PETROLEUM PRODUCTS IN KENYA; A CASE OF KENYA PIPELINE COMPANY DEPOT, ELDORET, KENYA

COMPLETE LIST OF AUTHORS:

Peter Ndegwa Gicharu [a]*, Yona Sakaja Mang'usho [b]

COPYRIGHT TRANSFER

The undersigned hereby assigns to the **Global Society of Scientific Research and Researchers (GSSRR)** and to the **American Scientific Research Journal for Engineering, Technology, and Sciences (ASRJETS)** ("ASRJETS ") all rights under copyright that may exist in and to the above Work, any revised or expanded derivative works submitted to ASRJETS by the undersigned based on the Work, and any associated written, audio and/or visual presentations or other enhancements accompanying the Work. The undersigned hereby warrants that the Work is original and that he/she is the author of the Work; to the extent the Work incorporates text passages, figures, data or other material from the works of others, the undersigned has obtained any necessary permission. **See Retained Rights, below.**

AUTHOR RESPONSIBILITIES

ASRJETS distributes its technical publications throughout the world and wants to ensure that the material submitted to its publications is properly available to the readership of those publications. Authors must ensure that The Work is their own and is original. It is the responsibility of the authors, not ASRJETS, to determine whether disclosure of their material requires the prior consent of other parties and, if so, to obtain it.

RETAINED RIGHTS/TERMS AND CONDITIONS

1. Authors/employers retain all proprietary rights in any process, procedure, or article of manufacture described in the Work.
2. Authors/employers may reproduce or authorize others to reproduce The Work and for the author's personal use or for company or organizational use, provided that the source and any ASRJETS copyright

notice are indicated, the copies are not used in any way that implies ASRJETS endorsement of a product or service of any employer, and the copies themselves are not offered for sale.

3. Authors/employers may make limited distribution of all or portions of the Work prior to publication if they inform ASRJETS in advance of the nature and extent of such limited distribution.

4. For all uses not covered by items 2 and 3, authors/employers must request permission from ASRJETS.

5. Although authors are permitted to re-use all or portions of the Work in other works, this does not include granting third-party requests for reprinting, republishing, or other types of re-use.

INFORMATION FOR AUTHORS

ASRJETS Copyright Ownership

It is the formal policy of ASRJETS to own the copyrights to all copyrightable material in its technical publications and to the individual contributions contained therein, in order to protect the interests of ASRJETS , its authors and their employers, and, at the same time, to facilitate the appropriate re-use of this material by others.

Author/Employer Rights

If you are employed and prepared the Work on a subject within the scope of your employment, the copyright in the Work belongs to your employer as a work-for-hire. In that case, ASRJETS assumes that when you sign this Form, you are authorized to do so by your employer and that your employer has consented to the transfer of copyright, to the representation and warranty of publication rights, and to all other terms and conditions of this Form. If such authorization and consent has not been given to you, an authorized representative of your employer should sign this Form as the Author.

Reprint/Republication Policy

ASRJETS requires that the consent of the first-named author and employer be sought as a condition to granting reprint or republication rights to others or for permitting use of a Work for promotion or marketing purposes.

GENERAL TERMS THAT ARE PART OF RETAINED RIGHTS/TERMS AND CONDITIONS

1. The undersigned represents that he/she has the power and authority to make and execute this assignment.

2. The undersigned agrees to indemnify and hold harmless ASRJETS from any damage or expense that may arise in the event of a breach of any of the warranties set forth above.

3. For jointly authored Works, all joint authors should sign, or one of the authors should sign as authorized agent for the others.

4. This journal and the Global Society of Scientific Research and Researchers (GSSRR) are permitted to republish the author paper in any other journals or books.

5. By submitting the publication fee, it is understood that the author has agreed to our terms and conditions which may change from time to time without any notice.

6. Before publishing, author must check whether this journal is accepted by his employer, or any authority he intends to submit his research work. We will not be responsible in this matter.

7. It should be clear for authors that the Editor In Chief is responsible for the final decision about the submitted papers. The Editor In Chief will send the paper for peer review to two reviewers, if the results were negative by one reviewer and positive by the other one; then the editor may send the paper for third reviewer or he take immediately the final decision by accepting\rejecting the paper. The Editor In Chief will ask the selected reviewers to present the results within 7 working days, if they were unable to complete the review within the agreed period then the editor have the right to resend the papers for new reviewers using the same procedure. If the Editor In Chief was not able to find suitable reviewers for certain papers then he have the right to accept\reject the paper.

8. If at any time, due to any legal reason, if the journal stops accepting manuscripts or could not publish already accepted manuscripts, we will have the right to cancel all or any one of the manuscripts without any compensation or returning back any kind of processing cost.

9. The cost covered in the publication fees is only for online publication of a single manuscript.

27/10/2017

Author/Authorized Agent for Joint Authors **Date (----------**

PLEASE DIRECT ALL QUESTIONS ABOUT THIS FORM TO:

The Managing Editor

editor@asrjetsjournal.org

FACTORS INFLUENCING SUPPLY OF PETROLEUM PRODUCTS IN KENYA: A CASE OF KENYA PIPELINE COMPANY ELDORET DEPOT, UASIN GISHU COUNTY, KENYA

by Peter Gicharu Ndegwa

Submission date: 18-Oct-2017 05:52PM (UTC+1300)
Submission ID: 864664609
File name: PETER_NDEGWA_FINAL_REPORT.doc (697.5K)
Word count: 20269
Character count: 126325

INFLUENCE OF FUEL SUPPLY FUNCTION ON THE MANAGEMENT OF PETROLEUM PRODUCTS IN KENYA: A CASE OF KENYA PIPELINE COMPANY, ELDORET DEPOT

ORIGINALITY REPORT

13%	16%	7%	14%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	kpc.co.ke Internet Source	1%
2	ccsenet.org Internet Source	<1%
3	Submitted to Ghana Technology University College Student Paper	<1%
4	ijsse.org Internet Source	<1%
5	Submitted to Kenyatta University Student Paper	<1%
6	Submitted to University of Nairobi Student Paper	<1%
7	iiste.org Internet Source	<1%
8	uir.unisa.ac.za Internet Source	<1%