

**FACTORS AFFECTING EFFECTIVE DISTRIBUTION OF PETROLEUM PRODUCTS
IN KENYA: A CASE OF KENYA PIPELINE COMPANY (KPC)****Achieng' Eric**

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ABSTRACT

Supply chain management in the Petroleum industries in Kenya has passed through many stages and made various strides to enhance its operations so that members and the general public are benefiting from in a broad perspective. Although the government has been involved in streamlining the supply chain system in the petroleum industry, it is marred by inefficiencies. Based on this concern, the study meant to establish the factors affecting effective distribution of petroleum products in Kenya with reference to Kenya Pipeline Company. The study was guided by the following specific objectives: To find out the effect of warehousing on effective distribution of petroleum products; to assess the effect of transportation on effective distribution of petroleum products and to establish the effect of lead times on effective distribution of petroleum products. The study targeted three hundred and two (n n=302) respondents among which thirty (n=30) of them took part in the study. The study used both primary and secondary data as its source and semi structured questionnaires as the main instrument of data collection. The collected data will be edited, coded and entered for analysis. The findings will be presented in pie charts, bar graphs, and tables for clarity. From the analysis the study found that warehousing, transportation, lead time and supplier relationship play a key role in the effective distribution of petroleum products. The study recommended that the management should ensure that storage facilities are well equipped and made convenient, there is need of reviewing the petroleum supply chain infrastructure, systems and investment in the sector to guarantee reliable, efficient and cost effective supply chain and that the management should ensure that the correct analysis of lead time is made in order to provide the industry with various benefits.

Key Words: *effective distribution, petroleum products, Kenya Pipeline Company, KPC*

Introduction

The various petroleum companies involved in the Marketing of petroleum products, Kenya Petroleum Refinery Limited (KPRL) (which operates the only oil refinery in the country) and the Kenya Pipeline Company Limited, which operates the pipeline that runs from Mombasa to Nairobi, Kisumu and Eldoret are the major players in the petroleum industry(PIEA,2011). The Energy Regulatory Commission (ERC) requires all oil marketers to refine at least 40 per cent of their products at the (KPRL) Kenya Petroleum Refinery Limited. The main marketers in the petroleum industry are Total, Shell and Kenol Kobil who control a total of 68 per cent of the petroleum market in Kenya And have been setting the pace for petroleum pricing however OiLibya, the fourth largest player, and National Oil have been closing the gap with steady growth of market share. There are also Independent dealers such as Hass Petroleum, Hashi Gulf Energy and Gapco Oil ((PIEA, 2011). Effective supply chain management is a vital function to help to ensure the success of the petroleum industry. The central aim of Supply Chain Management is to have the right products in the right quantities, at the right place, at the right moment and at minimal cost, effectively translating in to customer satisfaction. Customer satisfaction is dependent on the flexibility of the Supply Chain Management, i.e. its ability to respond to changes in demand. Flexibility is often imperfect because of long lead times, uncertainties, and unforeseen events (Arntzen, 1995).

In Kenya's competitive petroleum sector, being able to achieve a high degree of customer satisfaction is critical. What a firm selects as its distribution approach, can contribute either positively or negatively to this outcome, e.g. Business may be lost through cancelled orders, and the company's reputation may be severely damaged. Company's should therefore have effective distribution management systems to achieve high customer satisfaction (Arntzen, 1995).The Petroleum players including (KPC) Kenya Pipeline Co., the leading petroleum products distributor in Kenya, have some challenges and successes, all related to the way they handle & manage their major inventory at their disposal and how it impacts on customer satisfaction.

According to a study done focusing on the petroleum industry by a research firm Consumer Insight (2009), the inventory handling systems were not up to date and could not be classified as 70% reliable thus impacting negatively on distribution to the final consumers. Unreliability in the supply chain management systems used by petroleum players was found to be literally expensive and impacted poorly & directly on the company's bottom line results and its competitiveness in the long run (Nyikal, 2005).

Kenya Pipeline Company

Kenya Pipeline Company (KPC) is a state corporation that has been tasked with the responsibility of transporting, storing and delivering petroleum products to their clients by its pipeline system and oil depot network. The Kenya Company was incorporated on 6th September 1973 and started commercial operations in 1978. The company falls under the Ministry of Energy with 100% government shareholding (www.kpc.co.ke,2013).

Kenya Pipeline Company operates a pipeline system for transportation of refined petroleum products from Mombasa to Nairobi and western Kenya towns of Nakuru, Kisumu and Eldoret. Working closely with the National Oil Corporation of Kenya, KPC operates 5 storage and distribution depots for conventional petroleum products, located in Eldoret, Kisumu, Mombasa, Nairobi and Nakuru. Depots are fed by domestic-manufactured product from the Kenya Petroleum Refinery near Nairobi and imported, refined petroleum product from the Kipevu Oil Storage Facility near Mombasa (ERC report (2012)).

In collaboration with the Government, KPC facilitates the implementation of Government policies as well acts as a Government agent in specific projects as directed through the Ministry of Energy. The company works with the Government in the implementation of key projects such as the extension of the Oil Pipeline to Uganda and the LPG import handling and storage facilities. It also assists in the fight against fuel adulteration and dumping, not forgetting that it's also charged with the responsibility of ensuring the efficient operation of petroleum sub-sector (ERC report (2012)). Unlike some state corporations, KPC does not depend on Government subsidies, but is a source of revenue to the Government in terms of dividends and taxes. KPC overall objectives of being set up was to provide the economy with the most efficient, reliable, safe and least expensive means of transporting petroleum products from Mombasa to mainland(www.kpc.co.ke,2013).

Statement of the Problem

Kenya's oil industry contributes over 20% of the GNP;(KNBS,2011)The transport sector is the largest consumer of petroleum products at approximately 60% of the total volume followed by manufacturing 16%,commercial establishment 11%,households use 9% and agriculture 4%(KNBS,2011).The domestic demand for various petroleum fuels on average stands at 2.5 million tons per year(PIEA,2011)all of it imported from the gulf region, either as crude oil for processing at the Kenya petroleum refineries limited or as refined petroleum products(PIEA,2011). According to a study done focusing on the petroleum industry by a research firm consumer insight, Kenya pipeline company limited supply management system was found to be inept therefore making products handling systems not up to date and cannot be classified as 70% reliable thus impacting negatively on distribution to the final consumers (consumer insight, 2009). The Kenyan petroleum industry have been dodged with a lot of issues affecting their performance (PIEA, 2011).Inadequate storage facilities, poor risk management for instance volatility in transportation costs, capacity constraints leading to delays of clearing the products at the depots resulting too long lead times, supplier relationship issues, weak exchange rates, slump in the value of the shilling against the dollar, rise in prices of oil per barrel, and increased role of traders and speculators are all signs of an inefficient distribution(Economic Survey, 2011). Long lead times and other distribution inefficiencies continue to erode consumer satisfaction ultimately impacting negatively on Kenya's economic growth as stipulated in the vision 2030(PWC, 2011).Unreliability in the supply chain management system used by a company like KPC is expensive, and its impact affects the way its customers are served. Hence it impacts negatively and directly on the company's cash flows and its competitiveness in the long

run (Nyikal, 2005). Empirical studies have concentrated on the management of quality products in the supply chain (Awuor, 2013, Mwikali, 2012, Amadi, 2010), Economic problems and the Islamist terrorist in Nigeria (Schaefer & Cohen, 2004) and Tivnan (2009) has done a study on the relationship between oil and political stability in Kuwait, Nigeria, and Venezuela. This indicates that there is hardly any empirical study on quality aspects on the factors affecting effective distribution of petroleum products in Kenya. This study thus seeks to fill this knowledge gap.

General Objective

The general objective of this study will be to establish the factors affecting effective distribution of petroleum products in Kenya.

Specific Objectives

1. To establish the effect of warehousing on effective distribution of petroleum products.
2. To assess the effects of transportation on effective distribution of petroleum products.
3. To determine the effect of lead times on effective distribution of petroleum products.
4. To find out how supplier relationship affects effective distribution of petroleum products.
5. To find out the measures that can be put in place to promote effective distribution of petroleum products in

Theoretical Review

The SCOR theory on warehousing

Supply chain operations reference model (SCOR) was first developed by the management consulting firm PRTM, now part of price water house coopers and was endorsed by supply chain council as a supply chain management diagnostic tool. The management defines SCOR as a tool that enable the users to address, improve and communicate the activities within a supply chain and all the other parties involved. It spans from supplier supplier to the customer customer (Simchi-levi, 2008). This model was developed to clearly show the cycle involved in satisfying the customer demands and is based on process modeling, performance measurements and best practices. The process modeling pillar assist in describing simple and very complex supply chain activities. SCOR is based on a number of distinct management processes which include planning, sourcing, make decisions, deliver and return (Rolf, 2007).

Plan as a management process entails balancing aggregate demand and supply to develop a course of action which will best meet the source, production and delivery requisition. Source is all about procuring of goods and services that will meet the demand in the market (Rolf, 2007). Deliver has to do with processes of providing finished goods and services to meet the demand and this also includes order management, transport management and distribution management. Finally return entails processes associated with the return and receiving of returned products for reasons best known by the customer (Shreekant, 2012). The scope of the model covers the

interaction of the customer from order entry to invoice payment, all product transactions from the supplier to the customer in the supply chain including the spare parts, supplies, and the interaction in the market from understanding the knowledge on demand aggregate to the fulfillment of each order made. Other assumptions addressed by SCOR include the following; training, quality, information technology and general administration (Peter 2003).

The theory was developed for effective communication among partners of the supply chain. It also facilitates collaboration which is inter and intra within the supply chain, horizontal integration (Peter 2003). The model is used to describe measure and evaluate supply chains in a move of supporting the strategic plan and continuous improvement.

The performance measurements pillar contains more than 150 key indicators that are used to measure performance of the supply chain operations (Rolf, 2007). The SCOR performance metrics are organized in some of a hierarchy and level 1 metrics are typically used by top management decision makers to measure overall supply chain performance. Level 1 metrics are primary and do not necessarily relate to a SCOR level process which are plan, source, make, deliver and return (Rolf, 2007). The best practices pillar basically identifies what activities should be performed once the performance of the supply chain operations has been measured and performance gaps identified (Shreekant, 2012). The SCOR model defines best practice as a current which must not be emerging, structured; with stated goals, scope, process and procedure, proven; that is with proven success and repeatable method for making a positive impact on desired operational results (Simchi-Levi, 2008).

Lean theory on Transportation

Lean is a functional model which basically discounts the value of economies of scale and focuses on how to reduce costs as a result of small, incremental and continuous improvement (Robert, 2006). Lean transportation has certainly become increasingly significant in transport management. Initially organizations involved in manufacturing of products used to involve themselves in lean manufacturing techniques, this has ceased as lean has expanded beyond manufacturing (Linda, 2006). Lean transportation law seeks to explain how organizations should manage its transportation system and needs. It states that transportation can be used as a strategic differentiator by the organization and further goes on to say that not all transportation is about waste (Robert, 2006). The theory states that transportation strategies developed by an organization should support the customer's needs and expectations. Transport strategies should not be a driver on how and when a product will be delivered to a customer, rather, the customers' expectations should be understood and transport strategies is designed purposely to meet those expectations (Sharman, 1998). Real savings can only be realized through day to day management and optimization of transportation requirements variability. This therefore implies that costs associated with transportation cannot be achieved through inconsistent transportation network designs (Robert, 2006). Lean transportation poses the problem of cost inefficiencies in that the transport manager is challenged with the responsibility of always moving smaller quantities for both inbound and outbound shipment. This in itself contradicts the assumption of the large size cost efficiency (Brooks, 1993). This theory prompted the second research question.

Lead time Theory

The theory states that in circumstances where the market is dominated by poorly performing organizations, there is need for the company to develop more responsive order fulfillment processes (Woepfel, 2001). The theory further proposes that there is no need of higher quality products, a more advanced product, or a cheaper product. Lead can be an important competitive advantage tool when stock is not held in advance (Woepfel, 2001). Many non-profit making organizations where the customers are directly involved do make to order businesses (Newbold, 1998). The theory further states that you can't store a finished product ahead of time; thus lead time is of critical importance to any organization. Lead time is very important in customer perception of the organization performance (Newbold, 1998). The lead time has a direct impact on the business in situations where there is a make to order. When an organization has a shorter lead time than its competitors in a market constrained make to order environment then there is always a significant commercial advantage (Woepfel, 2001).

Partnership Theory on Supplier relationship

The common model through which theorists study the relationship between the supplier and buyer is known as the partnership theory (Larson, 2001). In its basic nature, the partnership model depicts the buyer and suppliers as partners with a common interest which is customer satisfaction (Larson, 2001). Partnership is a business relationship based on mutual trust, openness, shared risks and rewards that enables an organization gain competitive advantage leading in the company achieving a performance that's far much greater than the firms would have achieved when operating as single entities. This model requires efficient information exchange between the buyer and supplier which is a critical element of any partnership (Larson, 2001).

The theory further states that any partnership is always based on value and respect for each other. The solid and long term relationship simply implies continuous improvement of the organization performance (Tuten; Urban, 2001). Suppliers must provide better services that are of high quality than his competitors at a price reasonable and still achieve goals to remain in business (Payne, Ballantyne, 2001). Partnership model according to Winner et al, (2005) increases a company's efficiency through way of cooperation; both parties obtain cost reductions which leads to price reductions and therefore increasing the market share and profit margin as well. This leads to a company gaining a competitive edge and efficiency. The characters which forms the perceived attributes of partnership include the following; high frequency of both formal and informal communication, co-operative attitude, trusting relations are built, problem solving that is win negotiation style, long term business agreement, open sharing of information and there is always vendor certification and defect prevention approach (Hair et al 2004).

Motivation factors, environment of operation, strengths of operation and duration of operation vary in different partnership formed. However there is never an ideal relationship that is recommended (Paiva et al 2004). There are three types of partnership; the type 1 which is the most used. Companies recognize each other as partners, all the activities are co-ordinated, and planning is short term. Only one division within the organization is involved (Paiva et al 2004).

The second type is the type 2 partnership which basically integrates activities rather than coordinating as in the case in type 1. There are multiple divisions and entails a long term horizon. The last type of partnership is the type3 partnership which is not used frequently. Companies share high operational integration and each views the other as an extension of their firm (Paiva et al 2004).

The partnership theory has three elements which are drivers, facilitators and components. The drivers: each party must have a driver strong enough to provide them with realistic expectations of significant benefit through strengthening of the relationship. Facilitators on the other hand include corporate compatibility, mutuality, managerial philosophy and techniques and symmetry. The final element is the components which are the factors that can be controlled in a partnership by the management. They include planning, joint operating controls, communications, risk/reward sharing, trust and commitment, contract style, scope and financial investment (Larson, 2001). In conclusion in order to gain leadership position against your competitors and ensure the company grows, partnership can be used to achieve the above.

Conceptual Framework

Conceptual framework as a detailed description of the phenomenon under study accompanied by a graphical or visual depiction of the major variables of the study (Mugenda, 2008). According to Young (2009), conceptual framework is a diagrammatical representation that shows the relationship between dependent variable and independent variables. In the study, the conceptual framework will look at the factors affecting effective distribution of petroleum products in Kenya.

Independent Variables

Dependent Variable

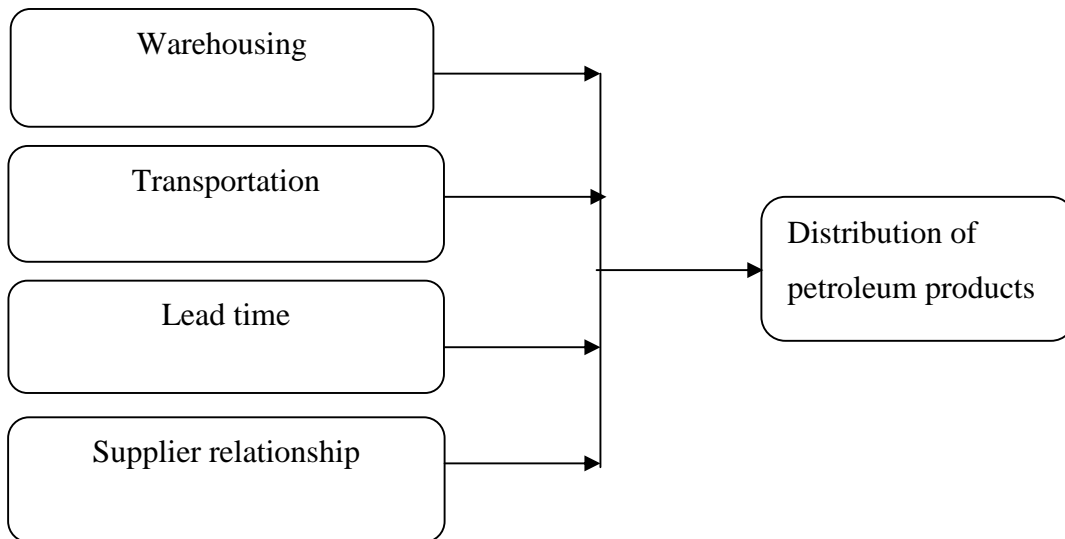


Figure 1: Factors affecting Effective Distribution of Petroleum Products

Influence of Warehousing on Distribution of Petroleum Products

Warehousing refers to the activities involving storage of goods on a large-scale in a systematic and orderly manner and making them available conveniently when needed (Mohan, 2012). In other words, warehousing means holding or preserving goods in huge quantities from the time of their purchase or production till their actual use or sale.

Warehousing is an important element of activity in the distribution of goods, from raw materials and work in progress through to finished products. It is integral part to the supply chain network within which it operates and as such its roles and objectives should synchronize with the objectives of the supply chain (Mohan, 2012). Warehousing and storage can be considered in terms of services for the production process and for product distribution. There have been major changes in the number and location of facilities with the closure of many single-user warehouses and an expansion of consolidation facilities and distribution centres (Addy-Tayie, 2012).

Warehousing occur when overall logistics costs are reduced. If adding a warehouse in a logistical system reduces overall transportation cost by an amount greater than required investment and operational cost, then total cost will be reduced since it involves consolidation and break-bulk, sorting, seasonal storage and reverse logistics hence enhancing the distribution of petroleum products. A storage warehouse holds products for moderate to long-term periods in an attempt to balance supply and demand for producers and purchasers. They are most often used by small businesses whose products' supply and demand are seasonal. On the other hand, a distribution warehouse assembles and redistributes products quickly, keeping them on the move as much as possible as it is a case of petroleum companies (Ducham, 2013).

Influence of Transportation on Distribution of Petroleum Products

The transportation is infrastructure that means roads, seaports, airports, rail, and canal. All these exist along nodes and links of transportation network. The transportation and infrastructure focuses on operational and policy issues within transportation and infrastructure areas that affect logistics operation (Chopra & Meindle, 2007). Transport system is the most important economic activity among the components of business logistics systems. Transportation plays a connective role among the several steps that result in the conversion of resources into useful goods in the name of the ultimate consumer. It is the planning of all these functions and sub-functions into a system of goods movement in order to minimize cost maximize service to the customers that constitutes the concept of business logistics (Chang, 1998).

The role that transportation plays in logistics system is more complex than carrying goods for the proprietors. Its complexity can take effect only through highly quality management. By means of well-handled transport system, goods could be sent to the right place at right time in order to satisfy customers' demands. It brings efficacy, and also it builds a bridge between producers and consumers. Therefore, transportation is the base of efficiency and economy in business logistics and expands other functions of logistics system. In addition, a good transport system performing in logistics activities brings benefits not only to service quality but also to company competitiveness (Cooper et al., 1997).

Since the transportation link allows the flow of goods between the various fixed points from the points of production to the points of consumption, oil manufacturing companies may face various challenges that may result from the failure of the transport system which may further negatively affect the distribution network. Ballou (2004) on the other hand noted that inexpensive, high quality transportation also encourages an indirect form of competition by making goods available to a market that normally could not withstand the high cost of transportation.

Petroleum transportation requires a greater amount of care, hence transported in specialized forms of transport. However, the most common forms of Petroleum transport are pipelines and LNG vessels. Petroleum can also be transported and distributed using road tanker trucks. Okogu (2002) noted that the main constraint to Petroleum sector development is the costly transportation of delivering Petroleum to the consuming markets.

The transportation and marketing of petroleum liquids involve many distinct operations, each of which represents a potential source of evaporation loss. These losses may include loading losses which are the primary source of evaporative emissions from rail tank car, tank truck, and marine vessel operations. Loading losses occur as organic vapors in "empty" cargo tanks are displaced to the atmosphere by the liquid being loaded into the tanks. Ballasting losses on the other hand are a major source of evaporative emissions associated with the unloading of petroleum liquids at marine terminals (Nichols, 1977). It is common practice to load several cargo tank compartments with sea water after the cargo has been unloaded.

Pipeline service has been attributed as the most dependable of all modes of transport due to few interruptions to cause transit time variability as weather is not a significant factor and the pumping equipments are highly reliable and damage for pipeline is low (Ballou (2004). However, pipelines are frequently subjected to vandalization in not only within the Niger Delta region of Nigeria but also among many other parts of the world. In terms of road transportation, Petroleum is transported in dedicated road gas tank-trucks. However, in Africa, bad roads, poor road networks and also various hindrances such as delays at police and customs check points obstructs an effective and efficient logistics (Jespersen & Nielsen, 2004).

Road infrastructures are large consumers of space with the lowest level of physical constraints among transportation modes. However, environmental constraints are significant in road construction. Road transportation has an average operational flexibility as vehicles can serve several purposes but are rarely able to move outside roads. However, due to the poor road infrastructure in Nigeria, the road transport systems have high maintenance costs (Pedersen, 2003).

On the other hand, Salavasidis (2012) indicates that transportation and distribution are two sectors of industry which should also be mentioned regarding safety issues applied in petroleum industry. Recorded incidents provide important information regarding hazardous events for example like oil spills, which usually are caused at terminals or by vessels' leakage. These are damaging the environment and may even cause human losses. Also, these accidents are damaging the reputation of companies which usually have to deal with extra costs of oil recovery

and compensations. Sometimes vessels and crews are faced with piracy which is not a random failure event. Also, terrorists could target pipelines and vessel as the potentially flammable material enables huge explosions. In these occasions safety problems are caused by criminal activity of some groups of people and not by random failures. Such dangerous conditions are unpredicted and in case of being attacked the destiny of the crew, the vessel and the containing fluids is unknown.

Influence of Lead Time on Distribution of Petroleum Products

Lead time is referred to as the time between order and placement of material and the actual delivery (Beamon, 1999). Lead time plays a fundamental role on the distribution of petroleum products. According to Silver (2013), the correct analysis of lead time provides the industry with various benefits which include but may not be limited to better understanding of the market behavior making it able to develop more profitable schemas that fit better with customer needs increases company ability to detect and correct any behavior that is not within terms agreed in the contract by penalization or different contract schema and creating an opportunity area to improve the customer relations by increasing the level of communication with them(Beamon, 1999).

The influence of lead time and transportation is highly related basing on the distribution of petroleum products. Delivery performance and end customer satisfaction levels may decline due to improper time management in transportation (Thomas, 1996). Delays can be caused by many factors that are outside the control of the outsourcing company. Examples include port/customs delays, labor disputes, weather, and political unrest. More extreme examples include terrorism-related delays and interruptions and uncertainty resulting from the outbreak of contagious diseases such as SARS. As lead-time and variability increase, so does the need for higher stock levels and other costly buffers, while overall supply chain confidence deteriorates (Thomas, 1996).

Harris and Jankin (1982) indicate that typical lead time problems are related to lead time length and reliability. From the buyer's perspective, the ideal situation has both short and reliable supplier lead times. However, for the supplier, longer lead times provide better scheduling flexibility and improved capacity utilization. Manufacturing lead time is a key factor in the petroleum industry. It is the time the supplier requires to produce the necessary items for an order. It typically involves the set-up time, processing time, materials handling time, and queuing time between the stages of production.

According to Thomas (1996), the interoperations time (non-processing time) generally accounts for the majority of the manufacturing lead time. In the manufacture-to-stock environment, the raw materials requisition and manufacturing lead times are eliminated from the purchaser's lead time since the manufacturer produces items in anticipation of future orders. Therefore, the order is met from the supplier's finished goods inventory and the purchasing lead time is shortened.

How Supplier Relationship Affects Distribution of Petroleum Products

Supplier relationships play a key role in many organizations. These roles include but may not be limited to optimize value through cost reduction, innovation, risk mitigation and growth throughout the relationship life cycle. Research indicates that parties entering a supply relationship are sometimes dissatisfied in about five to nine months later. Just like any other industry, where adversarial and confrontational attitudes exists suspicions can be fueled and the relationship between the supplier and contractor can be dominated (Timmermans et al, 2011).

With reference to the oil business, suppliers are more vital in meeting revenue objectives, as compared to majority of the customers in a company.

Supplier performance states whether and when customers get what they require, and when needed. Yet a lot of supplier relationships move around a tactical progression cycle. Supplier conveys the odder and latter the payments are made by the buyer, a repeated process is done monthly and the supplier is given little thought in between unless there is a risen issue. The database contains hundreds and thousands of suppliers hence the creation and differentiation of supplier approaches is great. The realization of the supplier connected to the supplier segmentation framework is the best way to have knowledge of supply (Rizza, 2013).

Empirical Review

Warehousing

Warehousing refers to the activities involving storage of goods on a large-scale in a systematic and orderly manner and making them available conveniently when needed (Mohan, 2012). In other words, warehousing means holding or preserving goods in huge quantities from the time of their purchase or production till their actual use or sale. Warehousing is an important element of activity in the distribution of goods, from raw materials and work in progress through to finished products. It is integral part to the supply chain network within which it operates and as such its roles and objectives should synchronize with the objectives of the supply chain (Mohan, 2012).

Mwikali (2012) carried out a study on the response strategies adopted by Kenya Pipeline Company limited to the challenges of oil distribution in Kenya. Basing on its methodology, the study adopted a case study research design because only one organization was involved. The study used primary data collected using an interview guide. The data obtained from the interviews was mainly qualitative. Content analysis was used to analyze the findings. The study established that the strategies developed were tied to the overall corporate strategy to enable the Corporation attain its strategic goals. The challenges facing the Corporation were both internal and external. They included: Capacity constraints with the Sinedet line to Kisumu being smaller, long processes of clearing the products by other stakeholders at the deports leading to delays in oil marketers collecting their products; change in technology which made some equipment at the Corporation obsolete; long and bureaucratic government procurement procedures which caused delay in maintenance.

The study recommended that devised several strategies to counter the challenges emanating from the changes in its operating environment including: reviewing the petroleum supply chain

infrastructure, systems and investment in the sector to guarantee reliable, efficient and cost effective supply chain; commissioning the construction of more storage facilities. The Corporation in conjunction with the Ministry of Energy developed guidelines which impose stiff penalties on oil marketers whose oil products overstay in the pipeline system and installation of flow meters to enhance product flow and distribution.

Transportation

The transportation and infrastructure focuses on operational and policy issues within transportation and infrastructure areas that affect logistics operation (Chopra & Meindl, 2007). Transport system is the most important economic activity among the components of business logistics systems. Transportation plays a connective role among the several steps that result in the conversion of resources into useful goods in the name of the ultimate consumer. It is the planning of all these functions and sub-functions into a system of goods movement in order to minimize cost maximize service to the customers that constitutes the concept of business logistics (Chang, 1998).

Gist (2013) conducted a study on the impact of the oil industry on economic growth performance in Nigeria. The study employed a multiple regression analysis to capture the influence of OREV on GDP and also determine the trend effect, that the effect of time as a variable. The study established that there has been environmental degradation, neglect of the people, abandonment of the agricultural and manufacturing sectors and a reasonable contribution to GDP, though with variation in the trend. It was also found that corruption in the Nigerian nation may have contributed immensely to the poor contribution of the oil sector to the economic growth of Nigeria whereby allegations abound where retired military officers and some influential politicians are offered oil licenses to lift and export crude oil and the proceeds are reflected in the private pockets of such people only.

This study however limited itself on the impact the of oil industry in the economic performance of Nigeria, more variables could still be included in the model and also more sophisticated econometric methods could be employed in determining the impact of oil industry in the economic performance of Nigeria. This study is highly related to the current one since it has come with various challenges facing the oil industry as it is a case in the current study which looks into factors affecting the effective distribution of petroleum products in Kenya Pipeline Company.

On the other hand, Salavasidis (2012) indicates that transportation and distribution are two sectors of industry which should also be mentioned regarding safety issues applied in petroleum industry. Recorded incidents provide important information regarding hazardous events for example like oil spills, which usually are caused at terminals or by vessels' leakage. These are damaging the environment and may even cause human losses. Also, these accidents are damaging the reputation of companies which usually have to deal with extra costs of oil recovery and compensations. Sometimes vessels and crews are faced with piracy which is not a random failure event. Also, terrorists could target pipelines and vessel as the potentially flammable material enables huge explosions. In these occasions safety problems are caused by criminal

activity of some groups of people and not by random failures. Such dangerous conditions are unpredictable and in case of being attacked the destiny of the crew, the vessel and the containing fluids is unknown.

Lead time

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According to Thomas (1996), the interoperation's time (non-processing time) generally accounts for the majority of the manufacturing lead time. In the manufacture-to-stock environment, the raw materials requisition and manufacturing lead times are eliminated from the purchaser's lead time since the manufacturer produces items in anticipation of future orders. Therefore, the order is met from the supplier's finished goods inventory and the purchasing lead time is shortened.

Bosire et al (2013) conducted a study on the impact of outsourcing on Lead-Time and Customer Service in Supermarkets in the City of Nairobi-Kenya. The study used a descriptive survey design to obtain information on the extent to which supermarkets outsourced services and the impact of outsourcing on lead-time. The population of the study mainly constituted of procurement officers, marketing managers, operation managers or their equivalents in supermarket headquarters within Nairobi city. The population of this study consisted of one hundred and two (102) Supermarkets while the sample consisted of fifty (50) supermarkets within Nairobi. The data collected was analyzed by use of frequency, percentage and correlation analysis. The study findings indicate that supermarkets outsourced advertising and marketing to a very large extent.

Consultancy and training, administration of information and systems maintenance, security, facilities maintenance, general maintenance and repair were also outsourced to a large extent. Although the study limited itself on the impact of outsourcing on Lead-Time and Customer Service in Supermarkets, it contributes to the current study where lead time is used as one the variables that influence the distribution of petroleum products.

Supplier relationship

Research indicates that parties entering a supply relationship are sometimes dissatisfied in about five to nine months later. Just like any other industry, where adversarial and confrontational attitudes exists suspicions can be fueled and the relationship between the supplier and contractor can be dominated (Timmermans et al, 2011).

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around a tactical progression cycle. Supplier conveys the odder and latter the payments are made by the buyer, a repeated process is done monthly and the supplier is given little thought in between unless there is a risen issue. The database contains hundreds and thousands of suppliers hence the creation and differentiation of supplier approaches is great. The realization of the supplier connected to the supplier segmentation framework is the best way to have knowledge of supply (Rizza, 2013).

Omori and Njeru (2009) conducted a study on regulatory and competition-related reforms in Kenya's power and petroleum sectors. The study established that Trends in the sale or consumption of petroleum fuels indicate that retail pump outlets and road transport constitute the single largest consumer of petroleum fuels followed by aviation and power generation. In addition, the study found that Tax policy measures on kerosene have far reaching implications on its consumption and household welfare. Kerosene has other implications on air pollution, health impacts on the poor and security concerns particularly when used to adulterate other fuels.

However, since the study limited itself into the regulatory framework and the application of regulatory and competition-related practices in the energy sector in Kenya, it specifically focused on the competition and regulatory systems and how they affect commercial provision of energy services involving private investment hence failed to give an outline on factors affecting effective distribution of petroleum products as in this study which will be looking at factors affecting effective distribution of petroleum products in Kenya Pipeline Company.

Research Design and Methodology

Research Design

A case study research design was used to provide an in depth analysis of the phenomenon. A case study research design is a scientific method of investigation in which data is collected and analyzed in order to describe the current conditions, terms or relationships concerning a problem of a given single dynamic scope (Mugenda and Mugenda, 1999). The study adopted this approach on the factors affecting effective distribution of petroleum products in Kenya with reference to Kenya Pipeline Company and the design was appropriate because it showed the relationship and examined how the factors support the problem within the company.

Target population

The target population for this study was 302 support staff members drawn from Kenya pipeline company departments that work hand in hand with the supply chain department. These departments will include; Supply chain management, finance, human resources, administration, legal and remedial, transport and premises, marketing and accounts officers. This was decided on since these are the departments that work hand-in-hand in ensuring proper storage, transportation and even distribution of oil is achieved.

Sample Frame

A sample is a group of cases, participants, events or records consisting of a portion of the target population, carefully selected to represent that population (Cooper and Schindler 2006). The sample frame of this study was 10% thus constituting 30 respondents who formed the sample size. The respondents are expected to provide reliable information on factors affecting effective distribution of petroleum products in Kenya: A case of Kenya Pipeline Company.

Sampling is the process of selecting units like people, organizations among others from a population of interest so that by studying the sample we may fairly generalize our results back to the population from which they were chosen (Trochim, 2006). The study used stratified random sampling to select the sample population since this method is not selective. The study sample population was 10% thus constituting 30 respondents who formed the sample size. According to Orodho (2003), stratified sampling is suitable where the population from which the sample is drawn is heterogeneous. Therefore, out of the 302 staff members (the respondents), the researcher used 30 respondents as the sample size from Kenya pipeline departments.

Data Collection Instruments

According to Cooper and Schindler (2011) there are many methods of data collection. The choice of a tool and instrument depends mainly on the attributes of the subjects, research topic, problem question, objectives, design, expected data and results. This is because each tool and instrument collect specific data. Primary data on the factors affecting effective distribution in the petroleum industry will be collected. Secondary data was obtained from relevant literature review from dissertations, journals, magazines and the internet. Primary data was collected using semi structured questionnaires. These questionnaires were constructed with both open and closed ended questions to enable for quantitative and qualitative analysis respectively. The questionnaire was divided into three sections; Section A will seek to establish personal details of the respondent, i.e. education level, profession and position in the company, section B will contain the specific objective of the study and section C will request the respondents for recommendations on the subject of study, i.e. Factors affecting effective distribution of petroleum products in KPC.

Data Collection Procedures

The owners of the company were contacted with the view of seeking permission to collect data and to explain the purpose of the study. Once this was done, the questionnaires were distributed to the support staff. The researcher in person made personal follow up to ensure that the entire questionnaires were collected back. This was done in coordination with a manager or line managers in charge. This process was done while assuring the participant confidentiality of the provided information.

Data Processing and Analysis

Once data begins to flow in, all the attention turned to how the data is to be analyzed. If it is done correctly, the analysis is considered to be done. Data preparation includes the process of editing, coding and data entry which ensures that accuracy of data is achieved. The researcher used both qualitative and quantitative techniques in analyzing the data. For the Qualitative analysis, the data that was received from the open ended questions and summarized to form themes, responses and explanations. Then the data was analyzed using content analysis (Chambers, 1985). For the quantitative analysis, the feedback was directly collected from the questionnaires, which were then coded and organized for analysis. All the information was put together and the researcher came up with a conclusion, recommendation and suggestion for future study.

Research Results

The discussion is based on the key findings of the study as established under the objective areas. These include influence of warehousing on the distribution of petroleum products, influence of transportation on the distribution of petroleum products, influence of lead time on the distribution of petroleum products and influence of supplier relationship on the distribution of petroleum products. The discussion is outlined based on the research objectives.

Effects of warehousing on distribution of petroleum products

When the respondents were asked to indicate the type of warehousing that was used in their organization, a vast majority of them, (60%) indicated that their organization used public warehouse. This was in contrast with slightly more than a third of them, (40%) who felt that their organization used private warehouses. Moreover, the public warehousing was responsible for balancing the demand and supply of products in their organization. Warehousing plays pivotal role in reducing the overall logistical costs in their company. This was due to a fact that majority of the respondents who took part in the study were in a agreement that warehousing played a key role in the reduction of overall logistical costs to a very great extent. This slightly coincides with Mohan (2012) who observed that warehousing is an important element of activity in the distribution of goods, from raw materials and work in progress through to finished products. It is integral part to the supply chain network within which it operates and as such its roles and objectives should synchronize with the objectives of the supply chain.

Influence of transportation on distribution petroleum products

Transportation has a great influence on the distribution of petroleum products in petroleum companies. This is evident since when asked to indicate that extent to which transportation affects the distribution of petroleum products, majority of the respondents, (70%) indicated that transportation affects the distribution of petroleum products either to a very great extent or a great extent. This is due to a fact that it plays a key role in ensuring efficacy in the company. Other than ensuring efficacy, it also increased indirect competition by making goods available in

the market to a very great extent. In addition, Majority of the respondents, (60%) indicated that transportation contributed in the competitiveness of the company in a moderately high manner. This is in accordance with Chopra & Meindl (2007) who indicated observed that transportation and infrastructure focuses on operational and policy issues within transportation and infrastructure areas that affect logistics operation. Transport system is the most important economic activity among the components of business logistics systems. Transportation plays a connective role among the several steps that result in the conversion of resources into useful goods in the name of the ultimate consumer. It is the planning of all these functions and sub-functions into a system of goods movement in order to minimize cost maximize service to the customers that constitutes the concept of business logistics (Chang, 1998). There are various challenges that affect the mode of transportation which in turn affects the distribution of petroleum products in the petroleum companies. These challenges include but may not be limited to poor operational and policy issues, delays at custom check points, unpredictable climatic conditions and poor infrastructure that increases transportation costs. Among these challenges however, poor infrastructure and delays at custom check points were the major transportation challenges that affect the distribution of petroleum products since they were proposed by an overwhelming majority, (80.9%) of the respondents.

Influence of Lead time on the distribution of petroleum products

Lead time affects the distribution of petroleum products to a great extent. This is due to a fact that it contributes to profitability scheme that fits customer needs to a very great extent and at the same time it increases detection and correction of behaviors that initially were not within the terms agreed in their company. This is evident since it was supported by majority of the respondents, (60.6%) agreed that that lead time increased detection and correction of behaviors that initially were not within the terms agreed moderately. This is almost the same as in accordance with Silver (2013) who points out that the correct analysis of lead time provides the industry with various benefits which include but may not be limited to better understanding of the market behavior making it able to develop more profitable schemas that fit better with customer needs increases company ability to detect and correct any behavior that is not within terms agreed in the contract by penalization or different contract schema and creating an opportunity area to improve the customer relations by increasing the level of communication with them.

Influence of supplier Relationship on the Distribution of Petroleum Products

Various types of petroleum companies adopt a particular kind of supplier model that can enhance competitive advantage of a given company or organization. Most of the companies however, adopt supplier buyer model as this is reflected in the study since majority of the respondents pointed out that their companies had adopted a partnership supplier buyer model. However, other companies may decide to adopt either an adversarial supplier buyer model or an interactive or lammings supplier buyer model. Basing on the notion that supplier relationship plays a

fundamental role in the distribution of petroleum products, the supplier relationship might be faced with various challenges that may end up deterring it from promoting effective distribution of petroleum products in the companies. These challenges may include but may not be limited to calculation of the return on investment (ROI), an occurrence of the SRM sales pitch, difficulty communication among suppliers and organizations and lack of enough time. However, among these challenges, majority of the respondents (84.8%) either strongly agreed or agreed that calculation of the return on investment and lack of enough time were among the key challenges on supplier relationship management that affects distribution of petroleum products. This reflects an observation made by Timmermans et al, (2011) pointing out that parties entering a supply relationship are sometimes dissatisfied in about five to nine months later. Just like any other industry, where adversarial and confrontational attitudes exists suspicions can be fueled and the relationship between the supplier and contractor can be dominated. Basing on various issues that affect the management of the distribution of petroleum products in the companies, an overwhelming majority of the respondents, (80%) pointed out that controlled supply chain Management is effective in managing the distribution of the petroleum products in the company either to a very great or great extent. Other issues included the management of distribution which contributes to customer satisfaction and the effects of distribution on the productivity of the organization. There are a number of measures that can be put in place to promote effective distribution of petroleum products in companies. Some of the measures given out by majority of the respondents include reviewing the petroleum supply chain infrastructure, systems and investment in the sector to guarantee reliable, efficient and cost effective supply chain and commissioning the construction of more storage facilities

Conclusions

Based on the findings of the study, the following conclusions are drawn: Warehousing plays pivotal role in reducing the overall logistical costs in their company. In addition, warehousing is an important element of activity in the distribution of goods, from raw materials and work in progress through to finished products. It is integral part to the supply chain network within which it operates and as such its roles and objectives should synchronize with the objectives of the supply chain.

Despite being faced by various challenges such as These challenges include but may not be limited to poor operational and policy issues, delays at custom check points, unpredictable climatic conditions and poor infrastructure that increases transportation costs, transport system is the most important economic activity among the components of business logistics systems. Transportation plays a connective role among the several steps that result in the conversion of resources into useful goods in the name of the ultimate consumer. It is the planning of all these functions and sub-functions into a system of goods movement in order to minimize cost maximize service to the customers that constitutes the concept of business logistics hence promoting effective distribution of petroleum products.

Lead time is a determinant key of the distribution of petroleum products. This is due to a fact that once it is analyzed correctly, it can provide the industry with various benefits which include but may not be limited to better understanding of the market behavior making it able to develop more profitable schemas that fit better with customer needs increases company ability to detect and correct any behavior that is not within terms agreed in the contract by penalization or different contract schema and creating an opportunity area to improve the customer relations by increasing the level of communication with them.

The competitive advantage of a given company greatly depends upon the kind of a supplier model adopted, most of the companies however, adopt supplier buyer model as this is reflected in the study since majority of the respondents pointed out that their companies had adopted a partnership supplier buyer model. Moreover, the supplier relationship can be affect the distribution of petroleum products once it is exposed to various challenges. Some of these challenges include calculation of the return on investment (ROI), an occurrence of the SRM sales pitch, difficulty communication among suppliers and organizations and lack of enough time.

Despite challenges facing the distribution of petroleum products among various companies, there are measures that should be taken into consideration in order to curb these challenges. Some of the these measures include reviewing the petroleum supply chain infrastructure, systems and investment in the sector to guarantee reliable, efficient and cost effective supply chain and commissioning the construction of more storage facilities.

Recommendations

1. It is recommended that the management should ensure that storage facilities are well equipped and made convenient to play an integral part to the supply chain network within which it operates and as such its roles and objectives should synchronize with the objectives of the supply chain to provide effective distribution of the products.
2. There is need of reviewing the petroleum supply chain infrastructure, systems and investment in the sector to guarantee reliable, efficient and cost effective supply chain. This is because transport system is the most important economic activity among the components of business logistics systems. It is the planning of all these functions and sub-functions into a system of goods movement in order to minimize cost maximize service to the customers that constitutes the concept of business logistics.
3. It is recommended that the management should ensure that the correct analysis of lead time is made in order to provide the industry with various benefits such as better understanding of the market behavior making it able to develop more profitable schemas that fit better with customer needs increases company ability to detect and correct any behavior that is not within terms agreed in the contract by penalization or

different contract schema and creating an opportunity area to improve the customer relations by increasing the level of communication with them.

4. Finally, there is need to ensure that all parties entering a supply relationship should ensure that they do away with adversarial and confrontational attitudes in order to enhance mutual relationship.

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