COMPETITIVE PRIORITIES AND TRADE-OFFS IN PHYSICAL DISTRIBUTION OF KENYA OIL INDUSTRY

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DECLARATION

This project is my original work and has never been submitted for a degree in any other University.
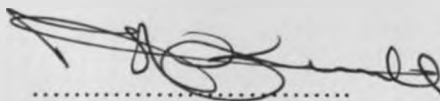
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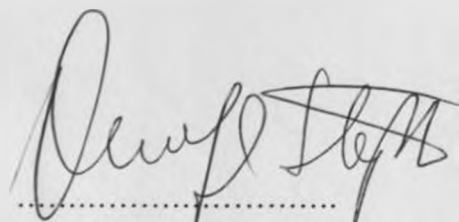This project has been submitted for examination with our approval as the University Supervisors.

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ii

DEDICATION

I dedicate this work to my parents,

Joseph and Jane Karuri

ACKNOWLDEGEMENTS

ABSTRACT

Because of the increased competition and liberalization of oil industry in Kenya, it has become imperative for the players to identify the dimensions through which to compete. This study was based on twenty four oil companies processing crude oil at Kenya Petroleum Refineries with the objective of identifying the competitive priorities that the firms employ, the constraints to achievement of these competitive priorities and any trade-off between them in physical distributions.

Primary data was collected for the purpose of this study by use of closed ended and open ended questionnaires. Part I of the questionnaire collected general information about the firms while part II collected information to meet the objectives of this study. Data was analyzed using descriptive statistics of frequencies, proportions, means as well as listings. Kruskal-Wallis test for non parametric independent group comparisons was used to analyze the trade-offs between quality, time, cost and flexibility competitive priorities.

The findings of this study indicate that the four competition priorities of quality, cost, time and flexibility are employed by the firms and are above average in level of importance. Quality related priorities however were found to be more important than the other three. This study also found out that the various competitive priorities are affected by different constraints. The research further found out that quality as a competitive priority was significantly more important than the other three at 0.05 level of significance.

In view of this study's findings some recommendations have been made. One, Kenya Oil companies should use the prioritization of quality, cost, time and flexibility in developing physical distribution policies and objectives. The government needs to facilitate oil business by enhancing the capacity of its logistics organizations that have been found out to constrain the achievement of physical distribution objectives. Oil companies need to lobby to the governments for representation in formulation of regulatory policies and legislations.

TABLE OF CONTENTS

List of Tables

CHAPTER ONE: INTRODUCTION

1.1 The Background

1.1.1 Concept of physical distribution

The major objective of physical distribution as defined by Su (1999) is to ensure that products are available at the right place at the right time in the right quantity to satisfy customers demand. He further argues that, for a physical distribution system to be successful the system needs to perform a series of important functions such as transport, warehousing, material handling and order processing. This therefore means that the various functions named need to be integrated for an effective system. No (1983) indicated that the high degree of coordination among various organizational units with different and at times conflicting objectives is one of the most difficult tasks facing a company is organization of physical distribution or logistics. The objective of getting the best means to deliver merchandise to customers is attained by minimizing the total distribution cost of delivering the products to customers at a given quality of service. Some of the costs include transportation, handling charges, and storage and inventory possession costs.

Physical distribution has evolved from when man began to have stores for food as buffer stock. That created the first supply chain to the current period when customers demand high standard of living which has to be met continuously by increasing the efficiency with which goods are supplied from where purchased or produced to where and when the customers need them for their consumption (Sussams, 1994).

High customer expectations, shrinking profit margins, homogeneity of products thereby leading to less brand loyalty create challenges in achieving superior performance over the players in the oil industry. The available physical infrastructure and their attendant costs and government regulations directly or through its other organs adds to the dilemma of the choices that oil companies have in making physical distribution decisions.

In his research paper, Su (1999) reaffirmed that, today physical distribution is generally considered as a major cost center a market tool and a critical factor to profitability and has consequently gained greater attention in corporate affairs in many organizations.

1

Practitioners in physical distribution are faced with situations which could be opposing and trade off or compromise decisions have to be made. Su (1999) gave an example of meeting the objection of minimizing the total travel cost by minimizing travel distance of delivery vehicles. This would however lead to late deliveries to some centers with possible to loss of sales or of customers to competitors.

Another trade off challenge as postulated by No (1997) would be trying to minimize inventory holding cost by increasing the frequency of deliveries to customers. Such decisions would in turn increase the company's transportation costs. He further gives the dilemma facing physical distribution and logistics managers in trying to achieve an optimal compromise on minimum physical distribution cost and maximum customer service. The diverting vectors of customer service demands and physical distribution coordination goals open another area of potential conflict in decision making.

Logistics managers are faced with greater customer volatility, higher customer expectations and with at the same time pressure by the management to reduce cost, Gareth et al (1998) observed. They further observe that for the above conflicting pressures to be reconciled, increased supply chain flexibility would be vital which therefore require both structural and system changes in logistics management. In such reconciliation an organization may be forced to make a trade off among the options available.

1.1.2 Perspectives of petroleum distribution in Kenya

According to Economic Survey (2004, 2007), there has been an observable increase in demand of petroleum products within the Kenyan economy and that of neighbouring countries. This has been fueled by the growth of industries like road transport, rail transport, aviation, power generation and manufacturing, pushing up the demand constantly.

Data in the Economic Survey 2007, show that, domestic sales of petroleum products rose by 12.2% to 3038.2 thousand tons in 2006 from 2707.5 thousand tons in 2005.

Demand for power generation, retail pump outlets and transportation, which constitute more than 50% of domestic demand as well as aviation, have increased by 21.1%, 14.7% and 8.2% respectively.

Most of Kenya's neighbours and those in Great Lakes Region namely Uganda, Tanzania, Rwanda, Burundi, DRC and recently Sudan continue to rely on Kenya's available distribution system of petroleum products in terms of structures and infrastructure. And most of the physical distribution and logistics decisions to these countries are made by locally incorporated oil companies which have increased from 16 in December 2003 to currently 42(KPRL entitlement statement June, 2007). The increased number of petroleum marketing companies implies increased competition both for the available distribution infrastructure and the customers.

The above circumstances have put the current distribution system and therefore the decisions which have to be made more complicated thereby posing new and varying challenges of meeting both local and regional customers' requirements to oil marketing companies.

Obath (2007) observed that Africa is faced with challenges in distribution of petroleum products since most of them lack well developed pipeline networks. He noted that, thought rail way is the next preferred mode, the network was in poor condition and most of then are state controlled with little investment on replacement or upgrading of networks to handle petroleum products. The rail networks run from coast to hinterland with very few arteries offering little effective distribution opportunities from main trade routes. With the pipeline and rail distribution challenges, oil companies are forced to turn to road transport. Obath (2007) however noted that the quality of roads, standard of vehicles and the economic operating environment is a challenge to operating this mode for distribution

The pipeline transport offered by Kenya Pipeline Company is at the moment fast tracking its capacity enhancement to meet the current and growing domestic demand for petroleum products, upcountry and for export at its western Kenya terminals of Kisumu and Eldoret.

In his budget speech, Kimunya (2007) acknowledged that the pipeline is not sustainable at the current throughput of 3.6 billion litres.

Environment Management and Coordination Act of 1999 has stringent rules handling petroleum and chemicals. It says in part "No person shall discharge any hazardous substance, chemical, oil or mixture containing oil into any waters or any other segments of the environment contrary to the provisions of this Act or any regulations hereunder.

A person who discharges a hazardous substance, chemical, oil or a mixture containing oil into any waters or other segments of the environment contrary to subsection (1) commits an offence. A person convicted of an offence under subsection (2) shall, in addition to any other sentence imposed by the court; pay the cost of the removal of the hazardous substance, chemical, oil or a mixture containing oil including any costs which may be incurred by any Government agency or organ in the restoration of the environment damaged or destroyed as a result of the discharge." Such regulations form major factors on decision on distribution system choices.

Kenya Revenue Authority through its Customs Services Department came up with Legal Notice No. 102 of 2005, that required all oil companies to pay up for duties and taxes upfront on import or after production entry points. This meant added extra costs to be carried in the inventory through the distribution system before delivery to customers, thereby posing challenges on when to pay and collect the product at Mombasa entry points both for domestic as well as export demands.

Physical distribution forms a key strategic component in delivering of goods from the suppliers to the final consumers. The choice and decisions made in the whole process has some effect on product costing and therefore the selling price which has to be competitive.

1.1.3 Key stakeholders in Kenya petroleum distribution

Petroleum products come into Kenya through the port of Mombasa. They are imported in form of refined products and crude oil. The refined products are received by Kenya Pipeline Company (KPC) for storage and transportation to upcountry destinations. The

4

crude oil is delivered to Kenya Petroleum Refineries Ltd (KPRL) for processing to various petroleum products. The petroleum business in Kenya is regulated by the Ministry of Energy (MoE), which also does the licencing. The ministry issues terms for joint importation and minimum stocks to be held by licenced oil companies as a national emergency reserve.

Kenya Revenue Authority through its Custom Services Department also has some effect on physical distribution of petroleum products. The department has stipulated the requirement for warehousing petroleum products, how much and when to pay duties and levies as well as import and export requirements. Legal Notice No. 102 of 2005 required that duties and levies shall be paid upon import of refined products at Mombasa (KPC) before being pumped to the oil companies. This requirement was also applied to products after their crude is refined at KPRL. The department also stipulates heavy penalties that would be payable in contraventions of the rules and regulations.

The section below looks at the roles of KPRL and KPC in physical distribution of petroleum products in Kenya.

Kenya Pipeline Company

The Kenya Pipeline Company (KPC) was established by Kenya Government in 1973 and was tasked to construct a pipeline system for transporting refined petroleum products from Mombasa to Nairobi. The actual construction of the pipeline commenced in 1976. The project was successfully completed by end of 1977 and commissioned in February, 1978 with a pumping capacity of 405 cubic metres per hour.

In 1992, the Government allowed KPC to undertake an expansion program to extend the pipeline from Nairobi to Western Kenya towns of Nakuru, Eldoret and Kisumu. This project was completed and commissioned in 1994 with a pumping capacity of 160 cubic metres per hour. It was later in 2004 upgraded to 220 cubic metres per hour. KPC operates storage facilities at:

- Kipevu Oil Storage Facility (KOSF), Mombasa;
- Moi International Airport, Mombasa;
- Jomo Kenyatta International Airport, Embakasi;

- Nairobi Terminal;
- Nakuru Depot;
- Eldoret Depot and;
- Kisumu Depot.

All oil marketing companies (OMCs) wishing to transport their products through the pipeline would have to sign a Transport and Storage Agreement with KPC. This agreement governs and controls the relationship between KPC and the OMCs. The agreement also provides line fill (stock permanently in the pipeline) and other operating stock that each oil company would contribute throughout the agreement period.

KPC transports the following products:

- Premium Motor Spirit (PMS);
- Regular Motor Spirit (RMS);
- Dual Purpose Kerosene (DPK) as Illuminating kerosene (IK) or Aviation Jet Fuel (Jet A-1) and;
- Automotive Gas Oil (AGO).

All the above products are transported through the same pipeline using the following batching sequence; AGO - PMS – RMS – PMS – AGO – DPK – AGO -. Requirement for all oil companies are consolidated to form a single product batch. Sharing of the batch volume is based on each oil company proportionate share of stocks at storage facility at the time of pumping.

Kenya Petroleum Refineries Limited

The Company was originally set up by Shell and BP jointly to serve the East African region as East Africa Refineries Ltd. The first Refinery Complex was commissioned in 1963, configured for distillation, hydro treating, and catalytic reforming and bitumen production. An additional Refinery complex was commissioned in 1974 capable of being operated independently; the two refinery complexes have a combined operational crude oil processing capacity of 9,100 metric tons of Murban crude per day (KPRL Data Book).

The refinery processes crude oil for petroleum marketing companies on the basis of processing agreements, which set out the precise terms on which the Refinery takes custody

of specific quantities and types of crude oil on oil companies' behalf, how they should be processing and delivered for a fee. The processing output varies according to the type of crude oil processed, specific requirement of each company, possible yields per product and the plant conditions. As at June, 2007 there were more than 42 oil companies with processing agreements with KPRL.

Crude oil to be processed is shipped, usually from the Gulf, in tankers of up to 80,000 metric tons capacity. These crude deliveries are imported by a single oil company on behalf of all oil companies by open tender system. The tendering process is regulated by MoE, and whichever oil company tenders the lowest crude purchase price is awarded the tender. The following products are produced at KPRL from the crude;

- Liquefied Petroleum Gas (LPG);
- Premium Motor Spirit (PMS);
- Regular Motor Spirit (RMS);
- Dual Purpose Kerosene (DPK);
- Automotive Gas Oil (AGO);
- Industrial Diesel Oil (IDO);
- Furnace (fuel) oils (FO) and;
- Bitumen

The refined products are delivered by pipeline to the customers' depots in Mombasa, Kenya Pipeline Company for transmission upcountry and to small tankers and barges as exports. Due to its high viscosity nature, bitumen is collected at KPRL and loaded using a special heating system to keep it in liquid form for ease of loading. All stocks of Liquefied Petroleum Gas (LPG or cooking gas), Industrial Diesel and Fuel Oils are delivered to Mombasa installations as directed by the oil companies. KPRL also delivers directly to big refining companies' customers like Kenya Generating Company and Tsavo Power Company upon oil company's instructions using a network of pipelines.

1.2   Statement of Problem

Chepkwony (2001) found out that the effects of liberalization in the Kenyan economy has changed the level of competition in which only the best organization in terms of offering best value to customers at the least cost will grow if not survive. Liberalization in the Kenya oil industry set foot in 1994, when the government relaxed the requirements for doing petroleum business that has ever since saw the players increase four fold. Chepkwony (2001) observed that, liberalization of Kenya oil industry has witnessed intense competition among the players and in order to survive, they have to make strategic changes in their internal dimensions.

Most of the Kenya physical distribution of petroleum products is in hands of third parties in terms of handling, warehousing, scheduling deliveries as well as transportation. Lutta (2003) however underscored the fact that, use of third party logistics in distribution does not hand over ultimate responsibility to the supplier of such services. He further clarifies that the use of these services is only delegation of handling responsibility and accountability with the organization being responsible for decisions made as regards its business goals and objectives.

Increase in number of players meant not only sharing the existing market but also the existing infrastructure available in physical distribution of petroleum products. Amolo (2002) found out that, most oil companies were constrained in achievement of operations objectives. Amolo (2002) identified infrastructure and government legislations as major most constraints with ratings of 88% and 75% rating respectively among those interviewed. In her study to identify physical distribution strategies in daily processing firms and their relationship to market performance, Odondi (2001) identified that, lack of credit facilities, poor infrastructure and slow changes in enactment and implementation of policy changes as some of the constraints affecting distribution of daily products in Kenya. In order to remain competitive an organization has to make the best and most relevant decisions in the prevailing circumstances.

To win in this competitive business companies will need to objectively select their competing dimensions in the wake of changing operating environment.

8

Chepkwony (2001) found out that 90% of the oil companies interviewed have reprioritized their goals from growth/profitability to survival first followed by growth/profitability.

In a research on operations strategy, Nyamwange (2001) found out that manufacturing firms in Kenya ranking high quality first followed by low cost with time/speed, innovativeness and flexibility ranking equally. In his research study Chepkwony (2001) observed that most oil companies regarded cost leadership as most important strategy as a response to competition. Nyamwange (2001) has recommended a replication or related research on competitive priorities and trade offs in another sector of the economy.

Most of the previous research in operations priorities deals with manufacturing operations, and more research is needed to address similar issues for logistics operations (Yeung et al., 2006)

No other studies have attempted to research on the area of competitive priorities and trade offs in physical distribution of petroleum products in Kenya. This research studied the four competitive priorities of quality, cost, delivery time and flexibility as put forward by Hayes et al (1984).

It's against this background that this research was carried to establish the competitive priorities and any trades-offs employed by Kenya oil companies in distribution of their products. The research sought to answer following questions:

i.   What are the competitive priorities employed by Kenya oil companies in their physical distribution decisions?

ii. What are the factors influencing the selection of these priorities?

iii. Are there trade offs or prioritization in selection of these priorities?

1.3   Research Objectives

The objectives of this project were to:

i.   Determine the competitive priorities employed by Kenya oil companies in their physical distribution decisions.

ii. Determine factors that influence competitive priority selection made in physical distribution by the oil industry.

iii. Determine any trade offs or prioritization of the competitive priorities in petroleum physical distribution decisions.

1.4   Importance of the Study

The study findings are expected to create more knowledge on physical distribution of petroleum products. It's anticipated to be of great significance to the following groups of people:

i.   **Industry.** The study will provide an insight in the kind of decision and decision choices made in physical distribution of petroleum in Kenya.

ii. **Management.** The study will provide typical decision challenges facing distribution and logistic managers in their effort to meet the corporate goals of their organizations.

iii. **Policy makers**. The study is expected to create a deeper understanding among policy makers on what physical distribution of petroleum companies entails and therefore enable them make appropriate supportive policies.

iv. **Academic** The study is expected to unravel the unique issues in physical distribution and therefore create new platform for further research.

CHAPTER TWO: LITERATURE REVIEW

2.1   Definitions

2.1.1   Trade-offs

Trade offs concept is one of the areas that many operations managers find themselves engrossed in time decision making in the competitive world of business. It now comes out clearly in the definition of manufacturing strategy by Skinner (1969)

Skinner (1969) and Bank et al (1979) defined trade offs as a balance between competitive objectives such as quality, delivery, dependability variety lead time and so on. They further advanced that trade offs take place when trying to achieve superior performance in one competitive objective, the performance of another has to be lowered. Trade offs implies devising an appropriate 'positioning' of an operations competitive objective according to their relative importance in the task of manufacturing strategy (Silveira, 2004).

Mapes et al. (1997) explained the concept of strategy trade offs as the achievement of high levels of performance on one factor which can only be achieved at the expenses of performance of one or more other factors. An implication of the above definition is that number of companies can compete in the same market, each meeting the specific needs of a segment of that market.

Gupta et al. (1997) defines trade offs in supply chain management as the optimization of the separate compound or sub parts of a supply chain at the expense of each other or of the whole system. Jackson et al (1994) describes trade off as similar to 'having our cake and eating it too'. They further elaborate this by giving the example of how logistics costs move in opposite directions or conflict.

2.1.2   Physical distribution

Rushton et al (2000) notes that, with the parallel growth in importance of distribution and logistics, the growth has see a number of associated names and different definition used to describe the activities of physical distribution. Some of the other names used include;

- Logistics
- Business logistics
- Marketing logistics
- Product flow
- Supply chain management
- Procurement and supply.

They note that there is realistically no unique or 'true' definition and each depends on products being handled, activities the organization is involved in and systems employed.

Bowersox (1969) defines physical distribution to "consist of those business activities concerned with transporting finished inventory and/or raw material assortments so they arrive at the designated place, when needed, and in usable condition. "

Stewart (1965) defines physical distribution as "science" of business logistics whereby the proper amount of the right kind of product is made available at the place where demand for it exists at the time it exists. He further defines it by linking "a system of interrelated activity "cogs," all centered around the key "inventory management" cog.

"Physical distribution is the efficient movement of finished product from the end of the production line to the customer and in some cases include the movement of row materials from the source of supply to the beginning of the production line. These activities include freight transport, warehousing, material handling, protective packaging, inventory control, plant and warehouse site selection, order processing, market forecasting and customer service."(US National Council of Physical Distribution Management (NCPDM))

Smykay et al (1961) define physical distribution as "that area of business management responsible for the movement of raw materials and finished products and the development of movement systems"

"Its that part of supply chain process that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods , services, and related information

between point of origin and point of consumption in order to meet customers' requirements", Stefansson 2006)

2.1.3 Competitive priorities

Ulosoy (2000) defined competitive priorities as the distinguishing characteristics of a company in the market related to its products and services.

Hayes et al (1984) suggested that companies compete in the marketplace by virtue of one or more of the following competitive priorities of quality, cost, delivery time and flexibility

Many authors and practitioners have added to and adapted this list over the years.

Foo et al (1992) for example proposed a set of six competitive priorities, adding 'Service' and 'Manufacturing Technology' to the above while expanding 'Time' into: time to market' and 'lead times' innovation, dependability

Quality, time, cost and flexibility can be defined in various different ways, (www.ifm.eng.cam.ac.uk, 24th June, 2007) gives various dimensions of the competitive priorities as below:

Dimensions of quality include the primary operating characteristics, optional extras (the "bells" and "whistles"), likelihood of breakdown, matching to the specification, length of time before the product becomes obsolete, ease of service, product aesthetics, perceived quality or reputation and value for money.

Dimensions of time include manufacturing lead time, due date to performance, rate of product introduction, deliveries lead time and frequency of delivery.

Dimensions of price and cost include manufacturing cost, value added to product or service, product or service selling price, cost of keeping the product running, cost of servicing the product and profit.

Dimensions of flexibility include ability to cope with incoming materials of varying quality, ability to satisfy demand for products of varying quality, ability to cope with the introduction of new products, ability to modify existing products, ability to change delivery schedules, ability to accept varying demand volumes and ability to cope with changes in the product mix.

2.2   Birth of Physical Distribution Concept

Bowersox (1969) has identified two possible explanations for the neglect and subsequent development of physical distribution. First, before the time that computers emerged from infancy and before applied analytical tools were generally at the disposal of business, there was no reason to believe that an overall attack on physical distribution activities would accomplish improved performance. The 1950s were destined to witness a major change in traditional orientation since neither computers nor quantitative techniques were to be denied the fertility of physical distribution applications.

The second factor is the prolonged profit squeeze of the early 1950s, highlighted by the recession of 1958, created an environment conducive to the development of new cost control systems. Integrated physical distribution provided a productive arena for new methods of cost reduction.

Bowersox (1969) in his literature review has identified four significant developments leading to crystallization of physical distribution concept as:

2.2.1   The notion of total cost
Total cost was developed as a measure of all expenditures required to accomplish a firm's physical distribution mission. Rushton et al (2000) recognizes that if the logistics costs are controlled separately, they can lead to sub optimization in the distribution system. Bowersox (1969) uses a study on air transport to illustrate that high freight rates required for air transport could be more than justified by trade-offs in reduced inventory possession and warehouse operation costs. Bowersox (1969) further notes that the

concept of total cost, while basic in logic, had not been previously applied to physical distribution economics. This was so probably because of the economic climate of the times, and the immediate reaction was that more attention was given to physical distribution problems. The above lead comprehensive treatment of physical distribution cost characteristics and related functional analysis of available in form of trade-offs for effective least total cost.

2.2.2   Application of the systems concept

Bowersox (1969) notes that it's the systems concept that provided a research posture, and total cost analysis offered a method of evaluating among alternative system configurations. In particular, he notes "it became apparent that the great deficiency of the traditional viewpoint was the prevailing practice of treating the many physical distribution activity centers as isolated performance areas. The result was a failure to capture the benefits obtainable only from integrated control." If all elements are viewed from a systems viewpoint, integrated physical distribution creates a new requirement for compromise between traditional business activities."

Rushton et al (2000) notes that, it's the recognition of the interrelationships between the various distribution elements that need to be considered rather than as individual elements that will lead to an effective distribution system. Various functions of an organization would have to be analyzed jointly rather than as independent ones. Manufacturing desires long production runs and lowest procurement cost, finance favours low inventory levels while marketing prefers staging and broad assortments of goods for forward marketing (Bowersox, 1969). These conflicting goals can only be best managed using systems approach of evaluation The above confirms the belief that integrated system performance can and most often will produce an end result greater than possible from non-coordinated performance rapidly became a primary focal point in development of the physical distribution concept. The logic of systems technology offered a regimented way to penetrate the traditional viewpoint.

2.2.3 Beyond cost

In 1960s' the field of physical distribution began to expand and more emphasis began to shift toward a more penetrating appraisal of improved customer service capabilities gained as a result of a highly integrated physical distribution system. There also arose the need synthesize the link between the physical distribution and managerial marketing (Lazer, 1962). Attention was now shifted to issues of demand cultivation to satisfy customer requirements and a motivator for physical distribution. It's in this period that physical distribution came into focus as representing a balanced effort between product delivery capabilities and related system alternatives. Bowersox noted that for programmed level of service to customers, several alternative systems might be capable of accomplishing the stated goals but at various levels of total cost expenditure.

2.2.4 Emphasis on temporal relations in distribution channels

An additional development in physical distribution thinking, Bowersox (1969) notes, relates to the dynamic elements of channel management. The majority of physical distribution systems have been studied from an organization point of view without looking at the effects on others in the whole delivery system. Stewart (1965) noted that, a soundly conceived distribution system can help to solidify and perpetuate a supplier's relationships with its customers.

Bowersox (1969) emphasized that physical distribution activities and related responsibilities seldom terminate when product ownership transfer occurs and further notes that most significant costs of physical distribution are experienced between firms linked together in cooperative vertical marketing systems. Interface of two or more individual firm physical distribution systems may well lead to excessive cost generation, duplication of activities and customer service impairment for the total channel he notes. To avoid the impact of time delays in the total system a more balanced approach considering the interrelated impact of spatial and temporal relationships emerged.

2.3 Benefits of Physical Distribution in Sales Generation.

Stewart (1965) has identified a number of ways in which an organization can design physical distribution system that can help to generate additional sales volume and therefore place it at a competitive advantage. Below are some of the ways:

Minimize out-of-stock occurrences - by minimizing out-of-stock occurrences through more accurate inventory placement and control, sales lost due to being out of stock will be minimized. This has the double advantage of increasing both actual sales volume and the level of customer satisfaction.

Reduce customer inventory requirements - a responsive distribution system can mean shortened customer order cycles. and, consequently, reduced customer inventories. To the extent that one company can develop a more responsive distribution system than its competitors, it will be possible for customers of that company to obtain an economic advantage by doing business with it.

Solidify supplier-customer relationships - a soundly conceived distribution system can help to solidify and perpetuate a supplier's relationships with its customers. This can be accomplished through integration of the supplier's delivery facilities with customers' receiving facilities, consignment of stocks to customers, and other devices of a similar nature.

Increase delivery discounts - the development of more efficient physical distribution procedures frequently produces sufficient cost savings to enable the sharing of part of these savings with customers in the form of increased delivery discounts.

Enable expanded market coverage - more efficient distribution operations frequently permit a company to compete more profitably and more effectively in distant markets, or in markets that previously were marginal. In this way the company is enabled to expand its distribution. which leads in turn to increase sales volume.

Allow greater concentration on demand creation - the development of a well-organized physical distribution activity in which a separate administrative group is established to plan and operate the distribution system can free up marketing and sales personnel-to allow them to concentrate more attention on their basic responsibility, demand creation. In many companies this has led to an expansion in the number of sales offices and a decrease in the number of warehouses, with a consequent reduction in total distribution costs.

2.4   Operations Competitive Priorities

Skinner (1969) identified the important role of "operations priority" in the formulation and implementation of corporate strategy, and contended that management must recognize tradeoffs when developing an appropriate operations priority. In this context, "operations priority" describes the manufacturers' choice of key competitive capabilities that drive the four common dimensions of manufacturing strategy (quality, cost, delivery, and flexibility), as also mentioned in subsequent research (Hayes et al, 1984). Ward et al (1998) developed scales for commonly accepted operations priorities.

Butler et al (2000) investigated the impact of operations priorities on hospital performance, in which operations priorities were measured by four factors: cost containment, quality, delivery, and flexibility; and performance defined as a composite of financial and operational performance. Zhao et al (2002) studied the importance of operations priorities of 138 enterprises in Mainland China in relation to the companies' perceived strength relative to competitors. They used six competitive dimensions to operationalize operations priorities: quality, cost and price, delivery, flexibility, after sales-services, and innovation. This study identified innovation, after-sales services, quality, and flexibility as the dominant operations priorities for Chinese enterprises in the following five years.

Christiansen et al (2003) identified links between strategic group membership, implementation of bundles of manufacturing practices, and operational performance using cross-sectional data. In this study, a sample of 63 Danish companies was divided

18

into four strategic groups, each group representing a distinct manufacturing strategy. These strategic groups were subsequently used to investigate relationships between the implementation of bundles of manufacturing practices such as Just in Time (JIT) and Total Quality Management (TQM), and operational performance. Researchers found that different strategic groups adopted different manufacturing practices, which in turn resulted in different operational performance. Lu (2004) studied the level of importance of logistics services from both a Third Party Logistics (3PL) user- and provider-perspective, and found cargo safety as the most important attribute, followed by custom clearance, inland transportation and electronic data transmission.

Stank et al (2003) studied the relationship between logistics service performance, loyalty, satisfaction, and market share. Recent research (Lai et al., 2004) examines different types of 3PL providers and their service performance, but does not address how operations priorities may affect business performance.

2.5   The Trade-offs Concept

The concept of trade offs is increasingly seen as central to operations strategy because it forms the foundation of how we conceptualize the improvement process. Silveira et al (2004). Its not that the concept is particularly new; its central to the finding works of manufacturing strategy (Skinner 1969) and has been implicit in most of the work on the subject since then.

Given that for all practical purposes; manufacturing systems are 'technically constrained' focusing on a narrow set of competitive objectives will give levels of performance far superior to those possible with a broader set of objectives. Silveria et al (2004) notes that superior performance in one competitive objective is gained primarily by lowering performance in another.

Since Skinner original article, it has been assumed by most manufacturers that improved performance on one factor can only be achieved by trading this off against reduced

performance on one or more other factors. Further support for the existence of trade offs between different performance areas has been provided by a number of writers like Fine et al (1985), Hayes et al (1984), Richardson (1985), Rosefield et al. (1985). If 1970s saw establishment of trade off concepts and the 1980s challenge to it, the 1990s have largely been concerned with finding some kind of compromise (Wacker, 1993)

Even Skinner (1992) suggested that although simplistic view of operations that excluded trade offs could not be sustained; his view of static and deterministic trade off did not reflect reality either. Skinner (1992) updated model view trade-off as like one before, but they are dynamic.

New (1992) in a slightly differing perspective, suggested that, although some trade offs between pairs of competition objectives had been overcome through changing manufacturing methodologies and technologies other trade offs (such as product specifications and cost) could not by their very nature.

Slack (1991) saw all trade offs as real in the short term but all capable of being overcome in the long term. This argument follows Ferdows et al (1990) sand cone model, suggesting that trade offs may be also contingent on a company's approach to development and the sequence of each of the performance dimensions.

Clark (1996) in a study, suggests that introduction of new technologies could improve many operations dimensions simultaneously but could not eliminate trade offs. He introduced the idea of performance frontiers at which trade offs would take place but any point below the performance frontier curve, an organization could experience simultaneity of improvement on cost efficiency and quality.

Many recent studies have tried to bring out the nature and relationships between individual competitive objectives although little consensus seems to have merged. Mapes (1996) in a survey has suggested that product variety was the only competitive objective with firm trade off characteristics.

2.6   Retrospectives of Trade-offs

There has been considerable (sometimes acrimonious) debate about the issue of continuous improvement protagonists view and the (old fashioned) manufacturing strategy view of the nature and extent of trade offs between manufacturing performance characteristic (New 1992) and Schonberger (1986) have in particular questioned the trade off model proposed by Skinner, arguing that some companies are able to improve on all aspects of performance simultaneously; for such companies there are no trade offs.

Schroider et al. (1996) have shown that many companies particularly Japanese are capable of producing high quality products at extremely low costs. Schonberger suggested that world class manufacturing firms could outperform competition in many areas simultaneously. Schroider et al.(1996) further indicated that trade offs were a 'myth' which held back operations managers from addressing what should be their prime concern of improving operations.

Collins et al (1993) similarly suggest the abandonment of trade offs recommending an approach that sought "compliments" between competitive objectives. Flynn et al. (1991) suggested that the introductions of just-in-time practices might add to positive synergies between different objectives.

Jackson et al (1994) in explaining the 'evaporating clouds' technique illustrated how to find a solution which causes the problem analogous to large black cloud disappear as opposed to choosing between conflicting alternative or seeking compromises among alternatives in the forward buying problem.

Skinner (1992) and New (1992) have responded to the above argument by saying that although the nature of trade offs is constantly changing, some trade offs still remain. New is specifically critical of the position adopted by Schonberger and presents an analysis which shows that, although modern manufacturing techniques have eliminated some trade offs between quality consistency and cost, customer lead time and delivery reliability, the trade off between quality specification and cost and product variety still exist. Skinner (1992) further argues that the nature of the correlation between

performance factors over time should not be seen as trade off relationships but performance relationships; implying that positive correlations may happen by chance rather that effort directed to improve both simultaneously.

2.7   Trade-offs Models Illustrated

2.7.1   The Trade-offs Model

Reducing   Increasing

COST   SPEED

Increasing   Reducing

The conventional trade-off model states that unless there is some slack in the system, improving any one of the four basic manufacturing capabilities - quality, dependability, speed and cost - must necessarily be at the expense of one or more of the other three. In the short term this seems to be the case. The picture often used is of a balance or a see-saw (above).

Slack (1991) has pointed out that there is an alternative to disturbing the balance and that is to raise the fulcrum or balance point, thus (in the example above) simultaneously reducing cost and increasing speed. In this example the fulcrum would be either quality or dependability. This ties in well with Ferdows et al (1990)'s "Sand Cone" model described below.

2.7.2   The Sand Cone Model

The Sand Cone model suggests that although in the short term it is possible to trade off capabilities one against the other, there is actually a hierarchy amongst the four capabilities. To build cumulative and lasting manufacturing capability, management attention and resources should go first towards enhancing quality, then - while the efforts to enhance quality are further expanded - attention should be paid to improve also the

dependability of the production system, then - and again while efforts on the previous two are further enhanced - production flexibility (or reaction speed) should also be improved, and finally, while all these efforts are further enlarged, direct attention can be paid to cost efficiency.

Most of the traditional management approaches for improving manufacturing performance are built on the trade-off theory. Ferdows et al (1990) suggest the trade-off theory does not apply in all cases. Rather, certain approaches change the trade-off relationship into a cumulative one - i.e., one capability is built upon another, not in its place.

Applying this model requires a long term approach, tolerance and patience. It requires believing that costs will eventually come down. Below is a presentation of the model.
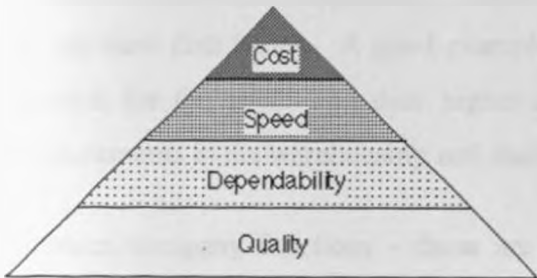
2.8   Trade-offs in Physical Distribution

Physical distribution and logistics involve a number of different elements which have to be integrated as one unit to achieve the total logistics goal. Rushton et al (2000) notes that it's the recognition that the interrelationships between the various different elements like delivery transport and storage need to be considered within the context of broader supply chain. It therefore means that various elements should not be considered as individual elements or subsystems in isolation if the various elements in the physical distribution are not considered as parts of a system, then that would lead to sub-optimization in the entire distribution system. This happens when one tries to optimize on one element but the costs effects on other elements may tend to be higher than the savings.

A more positive view point, Rushton et al (2000) remarks, is to interpret the interrelationships in a planned approach to identify and determine the trade offs which will provide a positive benefit to the entire logistics and distribution system.

Rushton et al (2000) identified four kinds of trade offs that need to be analyzed as part of the physical distribution and logistics planning management as;

Within distribution components – this are trade-offs that occur within single functions. An example would be a decision to use random storage locations compared to fixed storage locations in a depot. The random method provides better storage utilization but it makes picking of the items difficult; the fixed method makes picking easy but then, it does not provide good storage utilization.

Between distribution components - these are trade offs between the different elements in the physical distribution. A good example would be an investment in strong packaging material for the goods and thus higher costs, but then enjoy greater savings through improvements in the warehousing and easier storage of the good by stacking.

Between company functions - these are the number of areas of interface between a company's functions among which trade offs have to be made. A good example would be in optimizing the production run lengths and the associated warehousing costs of storing finished goods which are not required in the market soon. With the long production runs, the unit cost of production goes down while the storage cost for each product increases as each is stored for longer periods.

Between company and other organizations - trade-offs, Rushton et al (2000), may be beneficial for the organizations that are associated with each other. An example would be where a manufacturer would change from delivery direct to their retailers' stores, to delivering via the retailers' distribution system which can lead to mutual savings for both the manufacturer and the retailer. Mitchell et al (1992) describes this as 'symbiotic logistics relationship' where two organizations develop synergy that enhance each others ability to serve the ultimate customer

Over and above the logistics trade offs in total logistics concept there must be need to provide the service level required by the customer. This therefore means that there should be a balance between total logistics cost and customer service level for a distribution system to be a success (Rushton et al, 2000)

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Research Design

This chapter gives details on the research design to be employed to achieve the objectives of this study on competitive priorities and trade offs in oil industry. The research is designed to capture on oil companies' decision choices and characteristics in relation to their operation circumstances. This was an exploratory study of Kenya petroleum industry physical distribution.

3.2 The Population

The population of interest for this study consisted of all oil companies licensed to import and process crude at KPRL The population of interest was those companies that have been in operation in Kenya as at June, 2007. Since the number of oil companies is not large and can be categorized in terms of period in operation as well as those locally incorporated and multinationals, it was found prudent to survey all to enhance confidence in the research finding (Chepkwony, 2001) and to capture the diversity of the industry. A census study was be used.

3.3 Data Collection

This study used primary data obtained from oil companies' employees who are charged with making distribution policies and decisions.

A questionnaire with both structured and unstructured questions was used. One questionnaire was sent to each company by e-mail. Questions were clarified to respondent by telephone. This method was applied by Odondi (2001). Part 1 of the questionnaire was structured to capture each company's profile information while Part II was to capture the specific information relevant in achieving the stated research objectives of this study.

3.4 Data Analysis

Data collected in this study was analyzed using descriptive statistics. This included tables, frequencies, rankings, proportions/percentages and arithmetic mean scores. Some

data was collected using Likert scale with the upper number indicating highest level and lower indicating lowest level on characteristics/parameter being measured. The score for each parameter for the population was aggregated and an arithmetic mean determined. The different parameters were then ranked based on the mean. This kind of analysis has been used before by Chepkwony (2001), Kirui (2001) and Amolo (2002).

To determine trade-offs between competitive priorities, mean of relative importance of elements of each competitive priority was determined then tabulated. The data was then analyzed using the Kruskal-Wallis test; this test was used as the population of interest was small and the four variables of interest were non parametric and therefore comparable by ranking. 0.05 level of significance was used to test the data.

CHAPTER FOUR: DATA ANALYSIS, FINDINGS AND DISCUSSIONS

4.1   Introduction.

This chapter will deal with data analysis and findings of the research researcher objectives .The data is summarized and presented frequencies, proportions, means and rankings. The chapter documents general characteristics of the Kenya oil industry, competitive priorities employed by Kenya oil companies in physical distribution decisions, factors that influence the selection of competitive priorities that they employ is physical distribution decisions and any trade-offs between the competitive priorities. Data was collected from twenty four firms in the population of interest in this study. A list of the respondent firms in attached in appendix I

4.2   General Overview of Companies' Characteristics.

This section presents the general overview of the twenty four oil companies studied and their characteristics in relation to this study.

Table 4.1   Ownership of the company

	Company Incorporation	Frequency	Percentage	Cumulative Percentage
11	Locally incorporated company	17	70.83	70.83
12	Multinational subsidiary	7	27.17	100.00

Source: Research Data

Table 4.1 represents the ownership of the respondent firms. The respondent were asked to indicate if they were locally owned or were subsidiaries of foreign firms .This question was asked as ownership may have an influence on decisions that are made by companies in their operation decisions. 71% of the respondent firms are locally owned while 29% are subsidiaries of foreign companies.

Respondents were asked to indicate among the three periods, they have been in petroleum distribution business. Table 4.2 below represents periods that the respondent companies

have been in bulk petroleum sales and distribution business. This gives the profile of growth and entry into petroleum physical distribution business.

Table 4.2   Period in petroleum distribution business

	Periods in business	Frequency	Percentage	Cumulative Percentage
21	In business for more than ten years	10	41.67	41.67
22	In business between six and ten years	4	16.67	58.33
23	In business for five or less than five years	10	41.67	100.00

Source: Research Data

Ten of the respondents have been in business for more than ten years, four have been in business between six and ten years while ten have been in business for a period of five or less years.

Table 4.3.1 Number of petroleum products distributed by the firms

	Number of products distributed	Frequency	Percentage	Cumulative Percentage
34	Only four petroleum products	3	12.50	12.50
35	Only five petroleum products	1	4.17	16.67
36	Only six petroleum products	6	25.00	41.67
37	Only seven petroleum products	6	25.00	66.67
38	Only eight petroleum products	2	8.33	75.00
39	Only nine petroleum products	6	25.00	100.00

Source: Research Data

Table 4.3.1 represents the number of petroleum products distributed by the respondent firms. There are nine main petroleum products, and the respondents were asked to indicate which among the nine they distribute. The minimum number of products distributed by respondent firms is four with less than 17% distributing less than six products while 25% of the respondent firms distribute the whole range of nine petroleum products.

Table 4.3.2 below indicates the proportion of the respondent firms that distribute each of the nine main petroleum products. This gives a profile of products that are handled by the petroleum companies.

Table 4.3.2   Proportion of firms distributing each of the products

Products	Percentage
Premium motor spirit	100%
Illuminating kerosene	100%
Automotive gas oil	100%
Furnace (fuel) oils	92%
Liquefied petroleum gas	83%
Regular motor spirit	71%
Aviation Jet A-1	58%
Industrial diesel oil	42%
Bitumen	38%

Source: Research Data

All petroleum firms distribute premium motor spirit illuminating kerosene and automotive gas oil. Fuel oils, liquefied petroleum gas and regular motor spirit are the next heavily distributed at 92%, 82% and 71% respectively

Bitumen and industrial diesel are the least distributed at 38% and 42% respectively.

Table 4.4   Proportion of firms distributing each of the products

Product Sources	Percentage
Crude processing at Kenya Petroleum Refineries	100%
Private import of refined products	83%
Industrial imports of refined products.	79%
Purchases from other oil companies	75%

Source: Research Data

Table 4.4.1 indicates the proportion of firms that source products from each of the four provided sources. Respondents were asked to indicate among the four sources they procured their products. All the firms source some of their products from crude processing at Kenya Petroleum Refineries. 75% or more sourced products from the other provided sources.

Table 4.5 indicates the proportion of firms that do or do not own petroleum storage facilities

Table 4.5   Ownership of petroleum storage facilities

	Ownership of storage facilities	Frequency	Percentage	Cumulative Percentage
51	Own a petroleum storage facility	8	33.33	33.33
52	Do not own a petroleum storage facility	16	66.67	100.00

Source: Research Data

Respondents had been asked to indicate if they owned any petroleum storage facilities in Kenya. The findings show that a third or 33% of respondent firms own storage facilities while the remaining 67% do not.

Table 4.6   Firms in storage and transport contract

	Contact with Kenya Pipeline Company	Frequency	Percentage	Cumulative Percentage
61	In transport and storage contract	22	91.67	91.67
62	Not in transport and storage contract	2	8.33	100.00

Source: Research Data

Table 4.6 above indicates the proportion of respondent firms that are in storage and transport contract with Kenya Pipeline Company. All most all respondent firms are in the storage and transport agreement. Only 8% of the respondent firms are not in the contract.

Respondent firms were requested to indicate the extent to which they are internally able to influence their set product distribution objectives.

The research findings (Table 4.7) shows that most firms are able to influence to fairly or to a large extent, the direction of their set petroleum products distribution objectives with 37.5% and 41.67% of the respondents respectively. 12.5% of the respondents indicated that they had little influence while another 8.33% of them indicated that they are able to influence to a very the objectives very large extent

Table 4.7   Extent of influence in physical distribution objectives

	Extent of influence on set objectives	Frequency	Percentage	Cumulative Percentage
82	To a some small extent	3	12.50	12.50
83	To a fair extent	9	37.50	50.00
84	To a large extent	10	41.67	91.67
85	To a very large extent	2	8.33	100.00

Source: Research Data

4.3   Competitive Priorities Employed by Firms in Physical Distribution Decisions.

Respondents were provided with a list of competitive priorities elements and requested to indicate the ones they considered in their physical distribution decisions and the level of importance they attach to each.

Table 4.8   Competitive priorities employed in Kenya oil industry

Competitive priorities elements	Category	Mean
Maintaining product quality	Quality	8.42
Meeting customers service expectations	Quality	8.21
Meeting customers product specifications	Quality	8.08
Lead time from customers' order to delivery	Time	7.92
Reliability of transportation means	Quality	7.75
Lead time from order to suppliers' delivery	Time	7.21
Frequency at which products can be accessed	Time	7.00
Product landed costs	Cost	7.00
Inventory management costs	Cost	6.92
Transportation costs	Cost	6.58
Varying supplied volumes from KPC/KPRL.	Flexibility	6.42
Crude delivery time to accessing final products	Time	6.04
Customs duties/taxes/levies	Cost	5.96
Varying product delivery schedules.	Flexibility	5.83
Varying volumes demanded by customers.	Flexibility	5.54
Varying product specifications from customers.	Flexibility	5.17

Source: Research Data

No respondent indicated any other competitive priority over and above the ones provided in the questionnaire. The research shows that all competitive priorities are important with quality related priority elements getting highest scores on the provided scale of 1-9, with

nine indicating the highest level of importance while one indicates not important at all. Maintenance of product quality, meeting customers' services expectations and meeting products specifications scored above eight on the scale. The highest scoring time element is lead time from customers order to deliver with 7.92 mean score. Highest scoring cost priority element of imported products landed cost scores a mean of 7.00 with customs duties and taxes scoring lowest at 5.96. The research further shows that flexibility as competitive priority being least important on relative terms with the highest scoring element of varying supplied volumes from KPC/KPRL at 6.42. Flexibility elements of varying products delivery schedules, varying products demanded by customers and varying product specifications from customers score less than six at 5.83, 5.54 and 5.17 mean scores respectively.

4.4   Factors Constraining Achievement of the Competitive Prioritiess

Respondent firms were given a list of possible constraints in their physical distribution decision making and requested to indicate the ones that affect the achievement of each of the four competitive priorities. They were also given option of specifying any other constraints missed out in the list.

Table 4.9.1   Factors constraining quality as a competitive priority

Constraints	Frequency	Percentage
Product characteristics	14	58.3%
Environmental requirements	10	41.7%
Customers' requirements	7	29.2%
Refinery's production and operations	7	29.2%
Kenya road network	7	29.2%
Port/jetty capacity and operations	4	16.7%
Increased competition	3	12.5%
Government legislations	2	8.3%
Pipeline's capacity and operations	2	8.3%
Customs requirements	2	8.3%
Financial requirements	1	4.2%

Source: Research Data

The research shows that, achievement of quality competitive priority being constrained mostly by characteristics of petroleum product amongst 58.3% of the respondents. Environment requirements and regulations are second but with 41.7% of the respondents selecting it. The rest of the constraints provided were selected by less than 30% of the respondent firms.

Table 4.9.2 below shows that, most of the respondent firms are affected by most of the listed constraints with seven of them being selected by more than half of respondents. Port and jetty capacity and operation is selected by 75% of the respondents while pipeline capacity and operations, customs requirements and regulations and refinery production and operation follow with 70.8%, 66.7% and 62.5% respectively. Government regulation and Kenya road network were both selected by 58.3% of the respondents with customers' requirement being selected by half of the respondents.

Table 4.9.2   Factors constraining time as a competitive priority

Constraints	Frequency	Percentage
Port/jetty capacity and operations	18	75.0%
Pipeline's capacity and operations	17	70.8%
Customs requirements	16	66.7%
Refinery's production and operations	15	62.5%
Government legislations	14	58.3%
Kenya road network	14	58.3%
Customers' requirements	12	50.0%
Financial requirements	7	29.2%
Environmental requirements	3	12.5%
Product characteristics	3	12.5%
Increased competition	2	8.3%

Source: Research Data

Other constraints had less than 30% of the respondents seeing them as constraints to achievement of time as a competitive priority. One respondent indicated that communication to external physical distribution partners constrained the time objective.

The research shows (Table 4.9.3) that eight of the listed constraints were selected by 50% and above of the respondents. Financial requirements according to this study are the greatest hindrance to achievement of cost priority objective having been selected by 83.3% of the respondents.

Table 4.9.3   Factors constraining cost as a competitive priority

Constraints	Frequency	Percentage
Financial requirements	20	83.3%
Increased competition	16	66.7%
Refinery's production and operations	15	62.5%
Kenya road network	15	62.5%
Port/jetty capacity and operations	14	58.3%
Government legislations	12	50.0%
Pipeline's capacity and operations	12	50.0%
Customs requirements	12	50.0%
Customers' requirements	10	41.7%
Environmental requirements	6	25.0%
Product characteristics	3	12.5%

Source: Research Data

Increased competition, refinery production and operations, road network, port and jetty capacity and operation are other constraints selected by more than half of the respondents at 66.7%, 62.5% and 58.3% respectively. Government legislations, pipeline capacity and operations and customs requirements are selected by 50% of the respondent firms. Only 12.5% of the respondent indicated that product characteristics constrained time the objective.

The research shows that only three of the constraints affected 50% or more of the respondents in achievement of flexibility as a competitive priority. These are government legislations, customs requirements and pipeline capacity and operations with 62.5%, 58.3% and 50% of the respondents respectively. Port and jetty capacity and operations and refinery production and operation were selected by 45% of the respondents each, with the rest of the constraints being selected by 25% or less of the respondents.

Environmental requirements were least seen to constrain flexibility in physical distribution with 12.5% of the respondents selecting it.

Table 4.9.4   Factors constraining flexibility as a competitive priority

Constraints	Frequency	Percentage
Government legislations	15	62.5%
Customs requirements	14	58.3%
Pipeline's capacity and operations	12	50.0%
Port/jetty capacity and operations	11	45.8%
Refinery's production and operations	11	45.8%
Kenya road network	6	25.0%
Customers' requirements	5	20.8%
Financial requirements	5	20.8%
Product characteristics	5	20.8%
Increased competition	5	20.8%
Environmental requirements	3	12.5%

Source: Research Data

4.5   Trade-offs Between the Competitive Priorities

Kruskal-Wallis tests for ranking of competitive priorities in Kenya petroleum industry.

Table 4.10   Competitive priorities mean ranks

Competitive priority	Rank sum	N =	Mean Rank
Quality	1720.5	24	71.69
Cost	1164.0	24	48.50
Time	1013.5	24	42.23
Flexibility	758.0	24	31.58

Source: Research Data

The research shows quality being ranked as the most important competitive priority in physical distribution followed by cost, time and lastly flexibility with mean ranks of 71.69, 48.5, 42.23 and 31.58 respectively. At 0.05 level of significance, the test indicates significant differences between quality and flexibility, quality and time and quality and cost.

Table 4.11   Competitive priorities multiple comparisons

Multiple Comparisons	Difference	Q	Critical (0.05)
Rank(Quality) - Rank(Flexibility)	40.1042	5.001	2.639*
Rank(Quality) - Rank(Time)	29.4583	3.673	2.639*
Rank(Quality) - Rank(Cost)	23.1875	2.891	2.639*
Rank(Cost) - Rank(Flexibility)	16.9167	2.110	2.639
Rank(Cost) - Rank(Time)	6.2708	(Do not test)	2.639
Rank(Time) - Rank(Flexibility)	10.6458	(Do not test)	2.639

Source: Research Data

Group variable = Competitive priority

Observation variable = Level of importance

Test significance level α = 0.05

At the same level of significance as above, the test shows that there are no significant differences in means ranks of cost and flexibility, cost and time and time and flexibility.

4.6   Reasons for Inclusion of Competitive Priorities in Distribution Strategies.

The respondent firms were required to give reasons why they include or consider the four competitive priorities in their physical distribution strategies. The findings are as follows:

4.6.1   Reasons for inclusion of quality as a priority

i.   Delivery of quality products is a core value in the organization.

ii.   To ensure the customers satisfaction

iii.   To comply with government regulations like these set by Kenya Bureau of Standards.

iv.   Failure to meet quality standards and specification can lead loss of money and time.

v. To gain acceptance in the market products quality specifications must be met.

vi. To ensure safety since petroleum products are flammable and therefore hazardous.

vii. Better quality products lead to better performance on use; like mileage per litre.

viii. To meet customers' specific requirements.

ix. To mitigate against petroleum related disasters like oil spillage and fires.

x. To comply with the organization's health, safety, environment and quality (HSEQ) policy.

xi. To meet the set international standards for product like Jet fuel.

xii. To avoid penalties and costs related to poor product and service quality

xiii. To gain credibility and loyalty from customer and therefore company survival.

xiv. To meet the environmental requirements.

xv. To win in the competitive petroleum business product must be of highest possible quality.

xvi. Quality ensures good health and machinery/motor vehicle life.

xvii. To meet quality and environment standards set by international funding bodies like World Bank to the funded customers.

4.6.2 Reasons for inclusion of time as a priority.

i. Timely delivery is a core value in the organization.

ii. To meet statutory time requirement for export of transit petroleum products. Such products must be exported within 30 days of import.

iii. To hedge against international price movements (fluctuations).

iv. To meet customers satisfaction by timely deliveries.

v. Inventory turn around time guides the supply planning process to avoid over/under stocking related costs.

vi. To avoid loss of sales and even customers due to delayed deliveries.

vii. Requirement for quick and frequent replenishments by customers.

viii. Time and speed are competitive weapons in the competitive petroleum business.

ix. Limited time allowed for storage and warehousing by KPC and KRA.

x. Time is a cost element and wasted time leads to additional costs like port demurrage.

xi. Export loading time is limited for up to 11:00 a.m.

xii. Delays can lead to loss of business opportunities.

xiii. It's the most important factor between an order and delivery.

xiv. It determines the lead time for the distribution channel selected.

xv. Timely delivery impacts an image of reliability thereby creating customer loyalty.

xvi. To avoid penalties from customers due to consequential loss related to delayed deliveries.

xvii. Cost related to delay affects the organization margins and product pricing.

xviii. Time taken by different transportation modes is a key aspect in developing reliable distribution strategies.

xix. To ensure efficient utilization of available resources to optimize returns.

4.6.3 Reasons for inclusion of cost as a priority.

i. To be competitive, cost elements have to be controlled.

ii. To capture the price sensitive markets.

iii. To compete with low cost operating competitors.

iv. To help manage the payment of custom duties and taxes in advance.

v. To help select cheap and reliable transportation modes in the distribution chain.

vi. To operate at optimal working capital.

vii. For business success or survival.

viii. To avoid demurrage costs at the port.

ix. To mitigate against distribution costs related to poor infrastructure.

x. To sustain growth in sales and volumes customers must be given best prices.

xi. To manage cost of product acquisition and disposal to maximize margins.

xii. Poor management of costs affects the final selling price.

xiii. Distribution costs helps determine the minimum profitable volumes to operate on.

xiv. Some specific customer requirements attract premiums hence increased product cost.

xv. To comply with statutory requirements like processing at KPRL.

xvi.   To offer best prices without compromising product and service quality.

4.6.4   Reasons for inclusion of flexibility as a priority.

i.   To enable delivery to customers in distant places but at good margins.

ii.   To ensure customers satisfaction by adapting to their varying delivery requirements.

iii.   Flexibility in combining orders can lead to low distribution costs.

iv.   Some situations require flexibility in making make or break decision for the organizations.

v.   To manage distribution processes which are largely controlled by third parties from storage, volumes to be delivered to transportation.

vi.   To adjust to internal operations and charging demand trends.

vii.   It's critical to time and cost management.

viii.   To adapt to rigid infrastructure like jetties and KPC that cannot handle different product types simultaneously.

ix.   To varied end user preferences in the differentiated markets.

x.   To adapt to rigid government regulations and legislations.

xi.   To manage flexibility without adverse effect on other competitive priorities.

xii.   To adapt to the dynamic markets trends and therefore cope with changing local and international prices.

xiii.   To adapt to capacity problems in a monopoly of pipelines distribution network.

xiv.   To be competitive in the market.

xv.   To take advantage of opportunities in the competitive industry.

xvi.   To adapt to the ever changing customs regulations.

4.7   Discussions

This was an exploratory study of products physical distribution in the Kenya Petroleum Industry. The first objective was to determine the competitive priorities employed by Kenya Petroleum Oil Companies in their physical distribution decisions. The second was to determine factors that influence and reasons for inclusion of competitive priorities in

physical distribution by the Kenya Oil Industry. The third and last objective was to determine any trade-off or prioritization of competitive priorities in physical distribution decisions. To understand the findings of this study general characteristics of the Kenya Oil Industry have also been discussed.

4.7.1 General industry characteristics

The findings of this research indicate that firms that are locally owned constitute 70.83% of the respondents. These findings indicate a big growth in number of locally owned companies in petroleum distribution business compared to findings by Amolo (2002) where locally owned firms constituted only 25% of the industry. These findings are further supported by the number of new entrants into the industry in the past five years who constitute 41.67% of the respondents.

It can be noted from this study findings that not all petroleum products are distributed by the respondent firm. Its only 25% of the firms distributed all the nine products while two thirds distributed seven or less petroleum products. The study also reveals that there are some products that are more popular like premium motor spirits, illuminating kerosene and automotive gas oil which all respondent distributed. Bitumen and industrial diesel are least popular products.

While all firms sourced their products from refinery products as a government requirement, the study shows that other sources (table 4.4) are equally highly considered by the respondent firms. The findings of this research show that must oil companies do not own petroleum storage facilities and relied on third parties. These findings are further confirmed by the big number (91.67%) of oil companies that are in contract with Kenya Pipeline Company for transport and storage of their products.

4.7.2 Competitive priorities employed by petroleum companies in Kenya.

Respondent firms were provided with a list of competitive priorities elements for quality, time, cost and flexibility against which they indicated the level of importance they attached to each. The findings indicate that quality related competitive priority elements had the highest mean scores with product quality scoring 8.42% out of the 9 possible points. Though all respondents showed interest or attached some level of importance in all the elements listed, flexibility related priorities appeared least important with the highest having a mean score of 6.42, while the other of its other elements scoring a mean of less than 6.

4.7.3 Factors constraining achievements of competitive priority objectives.

Quality as a competitive priority the study found (table 4.9.1) was mainly being constrained by product characteristics and environment regulations and requirement. Only a very small proportions of the respondent think that the other listed factors affect quality objectives. Competitive priority of time, the study shows being constrained by most of the listed factors. More that 70% of the respondent indicated that port/jetty capacity and operations and pipeline capacity and operations were hindering the achievements of time related objectives.

Like time, cost as a competitive priority was being constrained by most of the listed factors (table 4.93). Financial requirements were exceptionally ranked highest with 83.3% of respondents indicating that it constrained the achievement of cost related objectives. Increased competition, refinery productions and operations and Kenyan road network were selected by more than 60% of respondents.

The research findings (table 4.9.4) show that flexibility in physical distribution was being constrained by government legislations, customs requirements and pipeline capacity and operations; all being selected by half or more of the respondent firms. The findings indicate there are some specific constraints affecting each competitive priority and those that have affect on more than one of the competitive priorities.

4.7.4　Trade-offs or prioritization of competitive priorities in the oil industry

A non parametric analysis for comparison of independent groups was conducted (tables 4.10, 4.11). The test findings indicate some level of prioritization with quality being ranked highest followed by cost, time and flexibility. Research finding further indicated significant prioritization of quality to the other three competitive priorities. Though cost, time and flexibility were ranked second third and fourth respectively there was no significant difference between any two of them.

CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

This is an exploratory study that had the objective of finding the competitive priority elements employed and factors that influence their selection. It was also the objective of this study to determine any trade-offs between the competitive promotions of quality, time, cost and flexibility.

Competitive priorities are the dimensions through which organizations endeavour to be competitive in the market and to create operational capabilities for growth. As Gareth et al (1998) noted logistic manager are faced with greater customer volatility, higher customers' expectations and pressure from management to reduce costs. To meet these demands managers in physical distributions have to get the right mix of competitive priorities to achieve best possible performance. This study shows that through the four competitive priorities are important; quality related elements are given more weight in physical distribution of petroleum products. This implies that quality as a competitive priority must be met first for the firms to remain competitive or even survive in the business.

The firms studied were required to indicate factors that constrained the achievement of set objectives on each of the four competitive priorities. This study shows that product characteristics and environment regulations to be the main constraints to achievement of quality objectives. The study shows that there are specific competitive priorities employed by the oil companies in Kenya.

Time objective as found out in this study is affected by most of the listed factors (Table 4.9.2) but third party related elements like port/jetty capacity and operations, pipeline capacity and operations and customs requirements were seen as greatest constraints by more than two thirds of the respondent firms.

Like time, costs was found to be constrained by most of the listed constraints (Table 4.9.3) but financial requirement to finance physical distribution is seen as greatest, having been selected by 83% of the respondents. Increased competition is second with refinery production and operations and road network tying at third place.

Government legislation and customs requirements were found to be constraining the achievement of flexibility related objectives by more than half of the responding. Third party operations were also found to contribute to the difficulties as shown in table 4.94. The results of this study indicate some trade-offs between the competitive priorities and further show that quality as a competitive priority is significantly superior to the other three. Cost ranks second, time third and flexibility last but the test shown that the three are not significantly different.

5.2   Recommendations

It's clear from the results of this study that the Kenya Oil Industry understands and appreciates the four competitive priorities of quality, time, cost and flexibility and attaches some level of importance on each in achievement of physical distribution objectives. The companies therefore need to come up with operations strategies and policies that ensure that they get the optimal mix of the four competitive priorities to achieve the best possible performance in their operating circumstances. Oil companies in Kenya as found out in this research appear to be constrained by government regulations and those of government organizations like Kenya Bureau of Standards and Kenya Revenue Authority. This industry should create lobby groups through which issues affecting the physical distribution of their products and thereby affecting business can be articulated before formulations of such regulations.

Third party service providers like the port and jetty, pipeline and refinery have been cited by the respondent firms as being major constraints towards achievement of time, cost and flexibility objectives. The government as a shareholder to such organization should come

up with long term plans to enhancing their capacity and efficiency to meet the needs of the fast growing industry.

It's apparent that financial requirement is a major challenge in the industry in terms of managing cost and consequently contributing to profitability. Oil companies could come up a joint negotiation club where they can be inviting financial institutions to make financing offers where the club's business would be given to one financier who gives the best terms.

Like the study shows ranking of competitive priorities it would be advisable for oil companies to employ the sand cone trade-offs model on building the priorities in the order of quality, cost, times and flexibility to achieve superior performance in physical distribution.

5.3   Limitations of the Study

Being a survey study the data and information was gathered by use of questionnaire sent to a population of forty two companies. It was however possible to get information from only twenty four firms. This is because some companies had suspended operations and therefore not reachable. Others received the questionnaires but could not respond citing company policy, lack of time, absence of right persons among other reasons. This therefore limited the gathering of data from the entire industry as proposed. The study further suffers from general misunderstanding of questions associated with questionnaire based data collection method. Contact time between the researcher and supervisors was constrained by locations distance. Despite the above limitations, the execution of the study was done with utmost care to minimize the effects of the limitations.

5.4   Suggestions for Further Research.

This was an explanatory survey that sought to establish the competitive priorities elements employed by oil companies, factors affecting their selection and trade off

between the priorities in physical distribution of petroleum products. Further research to improve on these findings could include:

(i).   In-depth analysis of competitive priorities applied by companies with different characteristics like period in business, size, ownership among others.

(ii).   Detailed study on difficulties in use of third party facilities in physical distribution performance.

(iii). A research to determine if there are order winners and order qualifier competitive priorities in petroleum physical distribution.

(iv).   Detailed study on effects of government and other regulations bodies on petroleum distribution business in Kenya.

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Appendix I – Data Analysis Tests Extracts

Frequency Tables

```
            C:\Program Files\TexaSoft\WINKS SDA 6\KENYA OIL
DISTRIBN.SDA
-----------------------------------------------------------------------
```

Number of records in database = 24

Frequency Table for CORP

CORP	Frequency	Percent	Cumulative Frequency	Cumulative Percent
11	17	70.83	17	70.83
12	7	29.17	24	100.0

Frequency Table for B_YEARS

B_YEARS	Frequency	Percent	Cumulative Frequency	Cumulative Percent
21	10	41.67	10	41.67
22	4	16.67	14	58.33
23	10	41.67	24	100.0

Frequency Table for PRODUCT

PRODUCT	Frequency	Percent	Cumulative Frequency	Cumulative Percent
34	3	12.5	3	12.5
35	1	4.17	4	16.67
36	6	25.0	10	41.67
37	6	25.0	16	66.67
38	2	8.33	18	75.0
39	6	25.0	24	100.0

Frequency Table for PSOURCE

PSOURCE	Frequency	Percent	Cumulative Frequency	Cumulative Percent
41	1	4.17	1	4.17
42	3	12.5	4	16.67
43	6	25.0	10	41.67
44	14	58.33	24	100.0

Frequency Table for STOREF

STOREF	Frequency	Percent	Cumulative Frequency	Cumulative Percent
51	8	33.33	8	33.33
52	16	66.67	24	100.0

Frequency Table for KPCT_S

KPCT_S	Frequency	Percent	Cumulative Frequency	Cumulative Percent
61	22	91.67	22	91.67
62	2	8.33	24	100.0

Frequency Table for OBJ_INFLUE

OBJ_INFLUE	Frequency	Percent	Cumulative Frequency	Cumulative Percent
82	3	12.5	3	12.5
83	9	37.5	12	50.0
84	10	41.67	22	91.67
85	2	8.33	24	100.0

Results of Non-Parametric analysis:

Group variable = PRIORITY   Observation variable = IMPORTANCE

Kruskal-Wallis H = 26.84

P-value for H estimated by Chi-Square with 3 degrees of freedom.

Chi-Square = 26.8 with 3 D.F.   p < 0.001

```
Rank sum group Q = 1720.5            N = 24    Mean Rank = 71.69
Rank sum group C = 1164.             N = 24    Mean Rank = 48.5
Rank sum group T = 1013.5            N = 24    Mean Rank = 42.23
Rank sum group F = 758.              N = 24    Mean Rank = 31.58
```

```
                                                          Critical

  q
        Tukey Multiple Comp.         Difference          Q        (.05)
        ---------------------------------------------------------------------
        Rank(Q)-Rank(F)  =            40.1042          5.001      2.639 *
           (SE used = 8.0193)
        Rank(Q)-Rank(T)  =            29.4583          3.673      2.639 *
           (SE used = 8.0193)
        Rank(Q)-Rank(C)  =            23.1875          2.891      2.639 *
           (SE used = 8.0193)
        Rank(C)-Rank(F)  =            16.9167          2.11       2.639
           (SE used = 8.0193)
        Rank(C)-Rank(T)  =             6.2708   (Do not test)
           (SE used = 8.0193)
        Rank(T)-Rank(F)  =            10.6458   (Do not test)
           (SE used = 8.0193)
```

Homogeneous Populations, groups ranked

```
            Gp Gp Gp Gp
             F  T  C  Q
            ---------
                   ---
```

This is a graphical representation of the Tukey multiple comparisons
test. At the 0.05 significance level, the means of any two groups
underscored by the same line are not significantly different.

Appendix II – List of Respondent Oil Companies

List of Oil Companies
1) Alba Petroleum Limited
2) Bakri International Petroleum (K) Limited
3) Chevron Kenya Limited
4) Dalbit Petroleum Limited
5) Engen (Kenya) Petroleum Limited
6) Fossil fuel Petroleum Limited
7) Galana Petroleum Limited
8) Gapco Petroleum Limited
9) Gulf Energy Petroleum Limited
10) Hashi Empex Petroleum Limited
11) Intoil Petroleum Limited
12) Kenya Oil Company Limited
13) Kobil Petroleum Limited
14) Metro Petroleum Limited
15) MGS International Petroleum (K)Limited
16) National Oil Corporation Of Kenya
17) Oilcom Petroleum Products
18) Oilmark Petroleum Limited
19) Riva Oil Products Limited
20) Royal Petroleum Limited
21) Shell Kenya Limited
22) Total Kenya Limited
23) Transoil Petroleum Limited
24) Triton Petroleum Limited

QUETIONNAIRE

DECLARATION

This research aims to understand your company and other oil industry companies'
competing priories, factors motivating their selection and any trade-offs involved in
making product physical distribution decisions.

There will be no wrong or right answers to the questions, and the results of this survey
shall be kept confidential and strictly for academic purpose.

Your honest participation in this survey will be highly appreciated.

PART I

Name of the company..

Position held...

Department/Function..

Q1.   Is your company locally incorporated or a multinational subsidiary?

Locally incorporated [   ]   Multinational subsidiary   [   ]

Q2.   For how long have your company been in petroleum import and distribution
business? Select one of the below periods.

i)   More than 10 years   [   ]

ii)   Between 6 and 10 years   [   ]

iii)   Five or less years   [   ]

Q3.   What products among the below listed does your company distribute?

i)   Liquefied petroleum gas   [   ]

ii)   Premium motor spirit   [   ]

iii)   Regular motor spirit   [   ]

iv)   Illuminating kerosene   [   ]

v)   Aviation Jet A-1   [   ]

vi)	Automotive gas oil	[ ]
vii)	Industrial diesel	[ ]
viii)	Furnace (fuel) oils	[ ]
ix)	Bitumen	[ ]

Q4. What are the sources of your products listed above?

i)	Industrial imports of refined products.	[ ]
ii)	Private import of refined products	[ ]
iii)	Crude processing at Kenya Petroleum Refineries	[ ]
iv)	Purchases from other oil companies	[ ]
v)	Other (specify)...

Q5. Does your company own storage facilities in Kenya?

YES   [ ]   NO   [ ]

Q6. Is your company utilising Transport and Storage Agreement service from Kenya Pipeline Company?

YES   [ ]   NO   [ ]

PART II

Q7. Kindly select by ticking (√) the competitive priorities elements that your company employ in physical distribution decisions and further indicate within the parentheses the level of importance you attach to each of the competitive priorities elements selected. 9 indicate very high level of importance while 1 indicates not important at all.

i.	Meeting customers service expectations	[ ]
ii.	Maintaining product quality	[ ]
iii.	Reliability of transportation means	[ ]
iv.	Meeting customers product specifications	[ ]

v.   Lead time from customer's order to delivery   [ ]

vi.   Lead time from customer's order to delivery   [ ]

vii. Lead time from order to supplier to delivery   [ ]

viii. Crude delivery time to accessing final products   [ ]

ix.   Frequency at which products can be accessed   [ ]

x.   Product landed costs   [ ]

xi.   Inventory management costs   [ ]

xii. Transportation costs   [ ]

xiii. Customs duties/taxes/levies   [ ]

xiv. Varying volumes demanded by customers.   [ ]

xv.   Varying supplied volumes from KPC/KPRL.   [ ]

xvi. Varying product specifications from customers.   [ ]

xvii. Varying product delivery schedules.   [ ]

Other (Please specify)

xviii. ……………………………………………………....   [ ]

xix.   ……………………………………………………....   [ ]

xx.   ……………………………………………………....   [ ]

Q8.   To what extent do you think company has influence in achieving the set product
       distribution objectives? 5 indicate to very large extent while 1 indicates to no
       extent at all.

       1. [ ]   2. [ ]   3. [ ]   4. [ ]   5. [ ]

Q9.   Are there constraints hindering your company's achievement of the set product
       distribution objectives?

       YES   [ ]   NO   [ ]

Q10.   If your answer to Q9 above is yes. please indicate by ticking (√) against the listed
       constraints the competitive priorities/objectives affected.

	CONSTRAINTS	Q	T	C	F
i	Government legislations				
ii	Customers requirements				
iii	Environmental requirements				
iv	Financial requirements				
v	Suppliers capacity				
vi	Product characteristics				
vii	KPRL production and operations				
viii	KPC transport capacity and operations				
ix	Kenya road network				
x	Increased competition				
xi	Customs requirements				
	Others (please specify)				
xii					
xiii					
xiv					

KEY: Q = Quality   T = Time   C = Cost   F = Flexibility

Q11   For each of the four competitive priorities, please indicate, according to your experience, the reason of its inclusion or consideration in your physical distribution strategies.

Quality

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Time/Speed

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Cost/Price

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Flexibility

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Q12   Please give any other information not captured in this questionnaire or comments
      that you consider useful to this study.

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