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Determinant Affecting Performance of Supply Chain Systems in the Petroleum Industries in Kenya

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The purpose of this paper was to analyze the effect of crude oil price as a determinant on performance of supply chain systems in the petroleum industries in Kenya. Supply chain is a dynamic process and involves the constant flow of information, materials, and funds across multiple functional areas both within and between chain members. Members in the chain need to cooperate with their business partners in order to meet customer's needs and to maximize their profit by reducing cost of crude oil. However, it is a very difficult task in managing the multiple collaborations in a supply chain because there are so many firms involved in the supply chain operations with its own resources processes also requires real-time operation and decision making across different tasks, functional areas, and organizational boundaries in order to deal with problems and uncertainties. The strategic move of focus for mass customization, quick response, and high-quality service cannot be achieved without more complex cooperation and dynamic structure of supply chains.

Key Words: Cost of crude oil, performance of supply chain

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INTRODUCTION

This study explored how crude oil price can be a determinant affecting performance of supply chain systems in the petroleum industries in Kenya. Empirical studies show that most successful oil companies do not only embrace customer satisfaction but they also do proper forecasting to mitigate shortages. The petroleum industry works as a global supply chain involving exploration, material handling, domestic and international transportation, use of technology, and so on. The industry offers a strong model for implementing supply chain management (SCM) techniques (Taylor, 2014). Supply chain management involves providing maximum satisfaction to end users (consumers), in other words, delivering the right product to the right person at the right time while still maximizing profits. Today, there are many opportunities for the coordination of activities across the supply chain even in the ever complex oil and gas sector. This is largely due to the development of information systems and communication technologies within the sector (W B, 2012b).

The oil and gas industry is one of the largest and most complex industries in the world today that touches on peoples' everyday lives with services ranging from transportation, electricity, heating, lubricants and a host of chemical and petrochemical products. Globally, a whopping 30 billion barrels of oil is consumed per year. The United States Energy Information Administration (EIA) in its 2011 International Energy Outlook projects that the world's energy consumption will increases by 53% by the 2035 (Lun, 2011). In Europe and Asia, oil accounts for 32% of energy consumption, whilst in the Middle East, 53%. For South and Central America the figure is 44% whereas in North America it is 40%.

Oil Pricing

The prices of internationally traded fuels and food surged until mid-2008, fell sharply, and then began rising again, reversing much of the price fall by 2011. By one measure, the prices on the world market have nearly doubled since 2005. The fiscal breakeven price of oil needed to balance the budget in major oil exporters has risen sharply in recent years, making the prospect of prolonged periods of low prices unlikely in the future. Equally important, the marginal cost of oil production in 2011 was US$92 a barrel for the 50 largest listed oil companies and could rise further if it continues to follow the long-term trend (Wall Street Journal, 2012). Similarly, long-term growth in global demand for food and continuing U.S. ethanol demand for maize and European Union (EU) biodiesel demand for vegetable oils are expected to keep prices of maize, oilseeds, and many other crops at historically high levels (Chadha & Gagandeep, 2013).

Many governments in developing countries control petroleum product prices. In the face of mounting subsidies, a number of governments seriously explored options for pricing reform in the period leading up to mid-2008. The budgetary pressure to press on with reform subsided briefly following the price collapse in late 2008, but those governments that had done little were caught by rising prices again soon thereafter (Zhu et al, 2013). To the extent that price increases on the world market have been transmitted to the domestic market, soaring prices have led to calls on governments across the world to take action, ranging from providing greater safety nets to the poor and increasing the minimum wage to releasing oil from strategic reserves, reducing taxes, and granting outright price subsidies (Bowersor et al., 2010).

Given the high share of household expenditure on food in some low-income countries, the food share can be as high as half or more, and even in middle-income countries it is typically 20 to 30 percent (WB ,2012b) rising food prices have made fuel price reform, politically difficult under any circumstances, all the more challenging. Conversely, rising fuel prices have compounded the political difficulties of reducing food price subsidies, as households face rapidly increasing expenditures on other basic goods. As a result, some countries have seen people taking to the streets to protest both high food and energy prices (Ministry of Energy and Petroleum (2013, November).

Price transmission to the domestic market has differed markedly from country to country. In the case of petroleum products, aside from price differences due to transportation costs and differences in fuel quality, international crude oil and petroleum product prices are broadly uniform across all regions, so that differences in government pricing policies account for much of the differences in end user prices. The price differences are significant: a recent price survey showed that the retail prices of four petroleum products in 65 developing countries in January, 2012 varied by two orders of magnitude, with the lowest prices found predictably mostly in major net oil exporting countries (Kojima, 2012). Muhammed et al, 2012 & Gagandeep, (2013), as in the years immediately following rising oil prices in 2004, which saw suspension of pricing policies linked to world price movements, some governments responded to high oil prices in 2011 and 2012 by freezing prices. Many interlinked developments have affected costs, availability, and prices paid for petroleum products in recent years.

Recent high oil prices have exacerbated the poor financial states of the national oil companies in some countries with price subsidies, leading to the inability to procure petroleum products on time, acute fuel shortages, and high black market prices; Fuel price subsidies in the face of high world prices have increased incentives for diversion to black markets and smuggling to neighboring countries. Delai & Takahashi (2013) observed that smuggling and black marketing can push up domestic prices markedly above the official prices; Power shortages in a number of countries have increased demand for diesel for emergency power generation, causing diesel fuel shortages in some markets and higher diesel prices. A growing cause of power shortage is declining rainfall, leading to falling hydropower generation in East Africa and elsewhere; Piracy in the Gulf of Aden and the Indian Ocean has increased insurance costs, led to shipping delays, and at times caused fuel shortages in East Africa; The challenges to the authorities mounted by citizens across the Middle East and North Africa since 2010 have stalled and sometimes reversed petroleum price reforms in several countries against the backdrop of declining perceived state legitimacy (Bowersox et al., 2010).

Oil forms a major source of energy in Kenya and world at large for it contributes about 40% of world energy consumption. Kenya's petroleum market has 73 major players and hundreds of independents. The oil sector has become highly competitive and is being characterized by

price wars and low sales margins. Industry data shows that petroleum dealers are currently selling retail price between Sh115.55 per litre to Sh115.80 per litre for super, Kerosene 87.12 to Sh 89.15 per litre for every litre of diesel 108.50 to 109.20 respectively (Muhammad, 2013). Kenyan Oil sector was liberalized in October 1994. It is regulated by Ministry of Energy through the Energy Act of 2006 and enforcement is done by Energy Regulatory Commission (ERC). Part IV of the Act (Petroleum and Natural Gas) deals with the issuance of business licenses for importation, storage, refining, exportation, sale and resale, transportation of petroleum and natural gas (Anderson, 2013).

Price Competition

Where prices are not controlled or only price ceilings are set, the government can promote price competition by making information available. The price information needs to be broken down by company, and preferably by filling station. In addition, it is important to promulgate and enforce a rule that requires prices to be posted on display boards at readable heights that are clearly visible to drivers (Muhammad, 2013).

Taylor, (2014) observe that some governments post detailed information about fuel prices to help consumers. Some list current prices only, others post recent but not current prices, and a handful lists both current and historical prices. Among the most detailed and timely is the online price database in Chile mandated by a resolution issued in January 2012 which is also available on iPhone, BlackBerry, and Android. The database gives viewers the choice of displaying data in order of increasing or decreasing price and the address of each filling station, prices, and the date and time of the last price change (Luthra et al, 2013). The government of Guatemala highlights on its Web site the filling stations with the lowest and highest prices in the Guatemala City Metropolitan Area with their addresses and street maps every week.

STATEMENT OF THE PROBLEM

The available literatures touches only on monetary values, showing that supply chain systems has no creativity and innovatability to exploit the benefit of crude oil price from all companies towards improving performance of up to 80 percent depending on the extent of adherence to supply chain requirements needs to have clear performance strategy (Zhu et al, 2013). These problems of often oil shortages resulted to this study to disclose challenges affecting performance of supply chain systems in the petroleum industries in Kenya.

(Fugate et al., 2010 & Luthra et al., 2013) observed that the studies available have largely remained far below the expected standards which was intended to meet this expectation of the oil companies. It's noteworthy that procurement efficiency and effectiveness cannot be achieved unless they are pursuant in tandem with the goals of supply chain performance. For instance supply chain goals revolve around embracing the five rights i.e. right quality, right quantity, right source, right time and right price respectively so as to maintain stock level inventory often, with longer term strategy goal revolving around the ultimate customer satisfaction, controlling of shortages, competency in skills and timely delivery of oil products to retailers (Meyer, 2010).

Specific Objectives

Generally, the research objective was establishing the extent to which cost of crude oil affects performance of supply chain systems in the petroleum industries in Kenya.

Also, to determine the moderating effect of legal and regulatory environment in the oil companies on the, relationship between, cost of crude oil and performance of supply chain systems in the oil industries in Kenya.

Crude Oil Price

The real (inflation-adjusted) price of crude oil is a key variable in the macroeconomic projections generated by central banks, private sector forecasters, and international Monetarily Fund (IMF). The recent cutback in Libyan oil production, widespread political unrest in the Middle East, and ongoing concerns about the state of the global recovery from the financial crisis have sharpened awareness of the uncertainty about the future path of the real price of crude oil. It seems surprising that, to date, no studies have systematically investigated how best to forecast the real price of oil in real time. One reason is perhaps that there has been no readily available real-time database for the relevant economic variables (Caniato et al, 2012).

First, even preliminary data often become available only with a lag. For example, it may take months for the first estimate of this month's global oil production to be released. Second, the initial data releases are continuously revised. It takes successive data revisions until we know, to the best of our ability, the true level of oil production in the current month. Little is known about the nature of these revisions in oil market data or about how data revisions and delays in data availability affect the out-of-sample accuracy of oil price forecasts. In recent research with (Baumeister and Kilian, 2013) observed the need to address this problem. They construct a comprehensive monthly real-time data set

consisting of vintages for January, 1991 through December, 2010, each covering data extending back to January, 1973. Back casting and now casting methods are used to fill gaps in the real-time data sets (Azevedo et al., 2011).

This database allows the construction of real-time forecasts of the real price of oil from a variety of models. Perhaps surprisingly, it can be shown that suitably constructed model-based real-time forecasts of the real price of oil are more accurate than the no-change forecast at horizons up to one year. This result holds both for the US refiners' acquisition cost for crude oil imports, which may be viewed as a proxy for the price of oil in global markets, and for the West Texas Intermediate price that receives most attention in the media. (The price of Brent crude oil is not available for a long enough time span to allow a similar analysis). These results are based on a forecast evaluation window covering January, 1992 through June, 2010. This window includes recent periods of turmoil in oil markets and provides a challenging test of the forecasting ability of alternative forecasting models. The evaluation criteria are the recursive mean-squared prediction error of the forecasts and their directional accuracy (Chan et al., 2012).

Petroleum price, like prices of many commodities, coincides with law of value, but it has its own singularity, for petroleum is a kind of special commodity. Intense fluctuation of petroleum price is one of the most spectacular phenomena during the process of international trade, for there is no price rising and falling rapidly in a short term. Petroleum price's historic trace is like rolling alp and coulee rising and falling, but this kind of rising and falling presents periodical changes, because there is certain intrinsic link between petroleum price and major influencing factors (production capacity of OPEC, operating rate, world average Gross Domestic Product (GDP), price of coal, price of natural gas, demand of petroleum, expenditure coefficient, balance between supply and demand of OPEC, productivity of non-OPEC, balance between supply and demand of non-OPEC Ministry of Energy and Petroleum (2013, November).

The first problem is that the interpretation of crude oil as an intermediate input in the value added production function is questionable if we think of oil as an imported commodity. Under standard assumptions, imported oil enters the production function of domestic gross output, but it does not enter the production function of domestic value added (Chan et al, 2013). Since gross output is separable in value added and imported energy, holding capital and labor fixed, oil price shocks do not move value added. Hence, oil price shocks by definition cannot be interpreted as productivity shocks for real GDP (Dao et al, 2011). Rather they affect the domestic economy by changing domestic capital and labor inputs. The second problem is that, to the extent that oil prices affect domestic output, under standard assumptions their impact should be bounded by the cost share of oil in domestic production, which is known to be very small. For example, for the United States, the ratio of imported and domestically produced crude oil in GDP has been fluctuating between 1 and 5 percent (Giovanni & Vinzi, 2012). Thus, if oil price shocks are viewed as cost shocks for the oil-importing economy, their effect by construction cannot be very large. In their study by Delai & Takahashi (2013) have demonstrated that standard production based general equilibrium models of the transmission of oil price shocks are not capable of explaining large fluctuations in real GDP (Sople, 2012).

Some countries have embraced price control, including all five West African countries. They use different variations of an import parity structure with international spot reference prices, market marine freight rates, and the dollar-local currency exchange rates as the three key short-term adjustment parameters.

A system of price control consists of two basic elements: The price buildup structure, starting with import-parity landed costs and adding storage, transportation, margins, and other costs; The adjustment mechanism comprising short-term adjustment parameters, and the frequency of and the trigger for adjusting prices With the exception of Malawi, the countries with price control adjust prices monthly. Malawi has a price stabilization fund and has no pre-set automatic adjustment frequency. The stabilization fund ran up a large deficit in 2008. Only in Botswana, Senegal, and South Africa is the price adjustment automatic, based on pre-established administrative procedures (Lin et al, 2013).

In Burkina Faso, Côte d'Ivoire, Mali, and Niger, in spite of having pre-established procedures, ad-hoc interventions occur in each adjustment. Pan-territorial pricing by definition means that true costs are not reflected in market prices, and reduces incentives to minimize costs because offering lower prices by improving supply efficiency is not an option. In Mali, for example, prices are maintained uniform through tax differentiation. Fuels obtained in the lowest-cost manner are taxed most heavily, and conversely highest-cost fuels are taxed the least. This means that cost savings cannot be passed onto consumers, and a firm cannot lower prices in the hope of expanding its market share. Astilla and Longo (2013) observed that in West Africa, for the most part, the prices are maintained uniform throughout each country. The only minor exception is Burkina Faso which adjusts ex-depot prices at Ouagadougou (Bingo depot) and Bobo-Dioulasso, and has two sets of prices depending on the location. The countries with sector liberalization have regional price variations established by the market. One exception is Madagascar where the logistics operator Société Logistique Pétrolière S*A*, a private firm that owns and controls all terminals and depots provides a common "postage stamp" ex-depot

price from all the depots in the country. Such a setup is unlikely to lead to a strong drive to increase efficiency and reduce cost (Bulk Oil Storage and Transporation, 2013).

A recent review of developing country governments' response to the oil price volatility of the past two years showed that, against the severe price rises of 2007 and 2008, few governments were able to withstand the pressure to use or increase fiscal measures to lower prices (Yang et al, 2013). As a result, some countries that moved to automatic price adjustment mechanisms years ago suspended price adjustment and bore financial losses. In West Africa, four of the five study countries engaged in price smoothing during the run-up in international prices from 2007 through mid-2008. Only Senegal maintained a consistent automatic adjustment process (Anderson, 2013). The adjustment timing and process steps to be taken every four weeks are defined in the 1998 sector restructuring legislation and have been rigorously followed. The other four countries, Burkina Faso, Côte d'Ivoire, Mali, and Niger, suspended automatic price adjustment based on a clearly defined import parity structure. Price stabilization was achieved through large fuel tax reductions (resulting in a loss of government revenue) or making the state supply company bear the financial losses. An added positive element in Senegal's pricing regime is the provision built into the legislation for a regular review of longer-term adjustment parameters such as distributor and retail margins (Sople, 2012).

According to Ghana Exploration and Production Forum (2013), the other four countries still rely on an ad-hoc approach to such adjustments three principal price components: Landed cost including cost, insurance, and freight, which covers the FOB price at the port from which the petroleum product is imported, marine freight and all freight/cargo-related costs, evaporation and other losses en route, and port fees to land the product in the pertinent receiving port, or, in countries with price control, hypothetical import-parity price corresponding to the landed cost used to calculate retail prices; Government take (referred to as tax hereafter), which includes all taxes, duties, and government fees that are incurred in the supply chain that go to the treasury or to earmarked funds; Oil industry component, which covers all gross margins for storage, inland bulk transport, local delivery, wholesale, and retail distribution (Sople, 2012). The difference between the retail selling price and the sum of the landed cost and government take represents the gross margin component available to the downstream petroleum industry. In markets where prices are liberalized, this number is derived by difference and is the least accurate of the three components.

Transportation of oil

Nowadays, the most beneficial and environmentally friendly way to transport oil is through pipelines, which moves at very high speed under high pressure, reaching up to three meters per second. The pipeline can be ground and underground and lay according to the terrain relief. The structure of pipes for pipeline includes highly plastic steel, reinforced plastic, which ensures its high reliability, resistance to damage, temperature and corrosion. Ground and underground pipelines has its pros and cons. First of all, ground pipeline is beneficial because in the case of an emergency, the damage is easier to find and fix than if it was located on ground. Underground pipeline has its advantages. For example, it much better protected against environmental influences than the ground method (Chandan, 2014).

Main threats in the Gas and Oil supply chains

These years, the oil and gas industry see environmental accountability as a top priority, underlined by the intersection between public concern and industry efforts. Many companies are facing different challenges with every aspect of the industry. At the moment, companies struggle with governmental policies and political situations. Specifically: regulatory and legislative changes and increased cost of compliance, fickle oil and gas prices, general national or global economic concerns and overall industry competition. Additionally, some reliable source such as oilprice.com (The No. 1 source for oil and energy news) claimed that environmental issues, climate change concerns and human capital deficit are even more important risk factors than any others (Dacker,2013).

Legal and Regulatory Environment

The government policies was in the Kenyan market to moderated against the challenges affecting performance of supply chain systems in the petroleum industries in Kenya, to disclose the alternative hypotheses whether there are existing relationship among the independent variable; cost of crude oil and legal and regulatory with the oil companies. Lin & Sheu (2012) observes that over the years, the oil and gas industry has continued to face growing challenges, from stricter government regulation, political risks, competition, emergent new comers and political hostilities, which has affected price hike and shortages. Due to the scramble for resources, many oil companies have been driven to explore and produce in some of the most hostile and harsh environments, which in turn tend to be extremely costly (Liu et al, 2012).

Also, there have been concerns in the industry about

the growing scarcity of natural resources, which underlies fears of not being able to meet production levels and goals. However, in reality, the resources are not the cause of supply restrictions with vast potential still available due to continuous discoveries of oil reservoirs around the world (Liu et al., 2012). The main challenge facing the oil and gas industry is not the availability of oil and gas resources, but putting these reserves into production and delivering the final products to consumers at the minimum cost possible. Thus, a solid supply chain management competency program will enhance this goal, Tax analysis and revenue forecasting are of critical importance for a government in ensuring adequacy and stability in tax and expenditures policies (Lun ,2011).The broad function of tax policy units are: (a) Monitoring of Revenue Collection. (b) Evaluation of the Economic, Structural and Revenue Aspects of the Tax Policy. Tax policies have to be weighed against the following criteria: economic efficiency; economic growth; revenue adequacy; revenue stability; simplicity; and low administrative and compliance costs. (c) Tax Expenditure Analysis. (d) Evaluation of the Impact of Non-Tax Economic Policies. (e) Forecasting of Future Tax Revenues. The several steps involved in the preparation of revenue forecasts are: evaluation of tax elasticity, evaluation of changes in economic conditions, and evaluation of the effect of inflation and price changes (Liu,et al, 2012).

Olugu & Wong (2012) observes that the policies, laws and institutions that presently govern the mineral sector in Kenya need significant reform if the sector is to grow sustainably and contribute to economic development and poverty reduction in the counties. The highest priority must be given to finalizing the Geology, Mining and Mineral Bill (2013), which has remained in draft form for some years. Kenyans need a shared vision of how the development of mining will take place at the counties, building on experiences gained from Titanium mining in Kwale (Olugu & Wong, 2012). The Bill must define the role and mandate of the state and its public mining institutions, and make very clear what public institutions at the county level will exercise; what the regulatory roles are and the relationships between them; how, if at all, decentralization might apply to governance of the mineral sector; specify the environmental obligations of operators consistent with internationally recognized safeguard standards; define arrangements governing provision for community development and benefits sharing, including the roles to be played by different stakeholders; and address the rights of vulnerable groups that might be impacted adversely by mineral sector development and measures for their protection (Schrettle et al, 2013).

Oil and natural gas development faces political and environmental issues. Political issues stem from the overlapping and disputed claims of economic sovereignty. Environmental issues pertain to the preservation of animal and plant species unique to the areas where oil, gas or other minerals have been discovered, particularly Turkana and Kwale. The environmental impact of oil exploitation is a dominant driver for most technology development in the industry today. Although much of this effort is focused on waste treatment and disposal, a significant amount of waste prevention will be crucial. Development of technologies to displace less material during mining will result in reduced environmental impact (Zhu et al, 2013).

Botswana in East and Southern Africa can be said to have reasonable to good systems. It is too early to draw conclusions about Kenya or Malawi where new regulators have very recently been established. The tables also show the results from Doing Business 2010, which tracks regulatory reforms aimed at improving the ease of doing business British Petroleum (2013). Doing Business ranks economies based on 10 indicators of business regulation that record the time and cost to meet government requirements in starting and operating a business, trading across borders, paying taxes, and closing a business; the rankings do not reflect such areas as macroeconomic policy, security, labor skills of the population, or the strength of the financial system or financial market regulations and (Fugate et al, 2010). While Burkina Faso, Côte d'Ivoire, Mali, and Niger need to update and strengthen their legal and regulatory frameworks. With the exception of Botswana and South Africa, the study countries suffer from weak enforcement and policing, even in those countries where a strong legal and institutional framework has been established. Inadequate regulations and weak enforcement allow too many oil marketing companies to operate in Kenya, Tanzania, and Uganda. This overwhelms limited enforcement capacity, making commercial malpractice an attractive way of making profits (Lin, 2013).

The remedy, in a liberalized market, is not to limit these companies by number but to ensure that the licensing criteria for operators are stringent and that compliance with rules to obtain and retain a license is enforced (Taylor, 2014, and Longo, 2013). One approach is to establish a separate body for inspection and enforcement, as in other developing regions such as South America, where strong, specialized, independent inspection institutions have been developed. These institutions have encouraged the formation of a cadre of private, certified inspectors, to which the enforcement institutions outsource work, minimizing their requirements for permanent staff. Senegal has already identified the need to update the legal texts developed as part of the 1998 reform, particularly in the areas of product specifications, open access, security stocks, and regulatory institution building. Lin (2013), Senegal plans to convert the Comité National des Hydrocarbures into a regulatory body, the Regulatory Body for Downstream Hydrocarbon Sub-Sector Activities.

An assessment of the cost-effectiveness of Kenya's Open Tender System managed by the ministry of energy, given that the volume of imports can easily justify more than one tender a month, may be useful. The Open Tender System for crude oil is linked to the requirement that all oil marketing companies process crude oil at KPRL. Consideration may be given to applying modest duty protection, for example on the order of 5 percent, to the refinery as a temporary measure and liberalize product imports, allowing competition between domestic refining and imports (Sople, 2012).

RESEARCH METHODOLOGY

The main objective of this study was to investigate cost of crude oil as a determinant of Oil Company's performamne.t hinder sustainability of small and medium family enterprises after the exit of the founders in Kenya. There were both quantitative and qualitative variables. Social scientists routinely collect data that is both qualitative and quantitative and carefully examine the patterns that emerge in an attempt to interpret, understand and explain social life (Kothari, 2011).

Research Design

The design enabled the study to combine both qualitative and quantitative research approaches. Qualitative approaches enables collection of data form of words rather than numbers. It provides verbal descriptions rather than numerical (Kothari, 2011).Qualitative methods can be used to gain more in depth information that may be difficult to convey quantitatively. Quantitative approach strives for precision by focusing on items that can be counted into predetermined categories and subjected to statistical analysis (Taylor,2013).The use of these two approaches reinforces each other (Zhu et al,2013). The research used this approach because the data collected used the main questionnaire was quantitative and was analyzed using statistics. Qualitative on the other hand involve interpretation of phenomena without depending on numerical measurement or statistical methods (Styles et al, 2012). The study explored the actual position of fuel shortages and supply chain systems on the challenges affecting performance in Kenya on poor forecasting from the industry. In trying to investigate the effect of the independent variables on the dependent variable, the study did not manipulate, cost of crude oil and performance of supply chain systems; the independent and dependent variables. They had already occurred. The challenge thus, was in how to control variance, when one has no control over the variables Johnson & Christensen (2012). The study did not control variance by direct manipulation or by random assignment. The concern here was on the performance due to fuel shortages, the dependent variable, which was influenced by one independent variable. These were some of the reasons why the study adopted this research design.

Sampling Frame

There are 73 registered oil companies in Kenya and this formed the sampling frame. The list of oil companies was obtained from Energy Regulatory Commission of Kenya (ERC) or registrar of companies in Kenya. The study employed a censuring sampling frame due to the fact that the targeted populations of entire stakeholders about 73 companies who are involved in day to daily in the oil industry management and other users were drawn from various stakeholders specified in the targeted population. (Meyer, 2010) states that this method was suitable because/ since it randomly select the required representative in the course of the study. This method of sampling frame enabled the researcher to draw a reasonable adequate sample size, where all the members of the population of interest had an equal chance of being addressed in the sampling frame (Zhu et al., 2013).

Instruments

The main research instrument that was used in this study was the set of questionnaires .In developing the questionnaire items, both closed-ended and open-ended formats of the item were used. This format was used in all categories of the questionnaires. However, in the fixed choice item, it involved 'putting words' in the respondents' mouth, especially when providing acceptable answers, there was temptation to avoid serious thinking on the part of the respondent. The respondent ended up choosing the easiest alternative and provided fewer opportunities for self-expression. It is because of these reasons that it was necessary to combine this format of items with open–ended response items to attract qualitative responses which gave the study in-depth feelings and perceptions of the respondents. The interviewer used survey questions to deeply probe the relationship between the variables under study. Meyer (2010), note that, survey questions address each research question satisfactorily and meet each objective.

The questionnaire was divided into six parts as follows: Part 1: General information of respondents; This section sought to find out the general information of the respondents such as Age, marital status, level of education, work experience, type of business, number of employees, etc. It also served the purpose of the preliminary study. Part II: Cost of Crude Oil; this section had items on the cost of crude oil and its effects on the

supply chain performance of the petroleum industries towards proper forecasting to mitigate fuel shortages. Part III: Dependent Variable; Performance; This section sought to find out whether the respondents had poor performance in their companies which resulted to often fuel shortages and how it influenced crucial fuel decisions and the effect of the same on the performance of fuel companies.

Qualitative data: Data frequency distribution and cross tabulation was used in describing and explaining the situation as it is in the enterprises. Data was coded and analyzed simultaneously as collected. Through content coding, a list of key ideas and themes for each variable was generated and this guided the nature of integration needed for both qualitative and quantitative data collected. Views and ideas that were frequently expressed were noted. This formed the basis for crosschecking and comparing the two sets of data and drawing of conclusions. Data was then operationalized through scoring for crosschecking with the quantitative data (Delai,and Takahashi, 2013).Quantitative data: Data was analyzed using descriptive statistics; measures of central tendency, measures of dispersion and measures of symmetry and inferential statistics. Scatter plots were used to show if the relationships wear linear. SPSS software version 20 was used as a statistical tool for analysis.

Linear regression analysis showed the correlation and strength of the relationship between variables both independent and dependent and the effect of the intervening variables on each relationship. Multiple regression analysis was thereafter conducted to test the overall effect on the study model. Analysis of Variance (ANOVA) was also to test the goodness of fit of the regression models and finally to test the hypothesis of the multiple regression models.

Data Presentation: The information was presented using a combination of statistical techniques and graphical techniques. Statistical techniques include: frequency distribution for grouped and ungrouped data, measures of central tendency; mean, median and mode to present characteristics that determine performance of supply chain systems; measures of dispersion these include range, variance, deviation ,coefficient of variability and percentiles. Graphical representations: This is presenting grouped data diagrammatically, the most common from being histograms, and polygon. At a glance once is able to make conclusions about the study (Yang et al., 2013).

Gender of the Respondents

The survey results indicated in table 1 shows that 60 (84.51%) of the respondents were men while the remaining 11 (15%) were women. The above results may be attributed to the strong male domineering culture in Kenya where until recently women were relegated to domestic chores. This culture is dying off and a large population of women population is now strongly competing with their male counterparts in most jobs (Luthra et al, 2013). The cultural, customary and religious beliefs governing performance and forecasting may also have contributed to the same.

Market Price at which you set your Crude Oil Price

Table 2 indicates, an average of three respondents who respondent to the written questionnaire, they indicated the minimum and maximum market price set by crude oil as ksh.10.00 and ksh.45.00 respectively, with mean of ksh.31.67 and standard deviation of 18.930.

Hypothesis 3

H_o: Cost of crude oil does not significantly affect performance of supply chain systems in the petroleum industries in Kenya.

Regression

The linear regression analysis shows a relationship, R = 0.643 and R2 = .414 which means that 41.1% of the corresponding change in cost of crude oil after the f the founder can be explained by a unit change in performance . A further test on the beta coefficient of the resulting model, the constant α = -0.168 is not significantly different from 0, and since the p value p = 0.004 is greater than p= 0.05, the constant is not significant. However, the coefficient β = 0.534 is significantly different from 0, model analysis of regression is shown in table 4. Regression indicates the strength of the relationship between the independent variables and the dependent variable (performance). The R square value in this case is 0.414 which clearly suggests that there is a strong relationship between the independent variables and the dependent variable. This indicates that the independent variables share a variation of 41.4 % of performance. This implies that if all the oil companies can enhance cost of crude oil, skills, ICT and tendering systems challenges affecting performance of supply chain systems in the petroleum industries in Kenya will minimize fuel shortages.

Testing Hypothesis: This explains α that if were held constant then performance will be -0.168 (low) and therefore the gradient (β) and the performance would be very low. The Anova test in Table 3 shows that the significance of the F-statistic is less than zero. This implies that the null hypothesis $\beta 1=0$ is rejected and the

Table 1. Gender of the respondents

	Frequency	Valid Percent
Male	60	85
Female	11	15
Total	**71**	**100**

Table 2. Market Price Percentage

Descriptive Statistics	N	Minimum	Maximum	Mean	Std. Deviation
what % of market price at which you set your Crude Oil Price	3	10	45	31.67	18.930
Valid N (list wise)	3				

Table 3. Correlations on Cost of Crude Oil

		Performance	Cost
Performance	Pearson Correlation	1	.643**
	Sig. (2-tailed)		.000
	N	58	58
Cost	Pearson Correlation	.643**	1
	Sig. (2-tailed)	.000	
	N	58	58

**. Correlation is significant at the 0.01 level (2-tailed).

alternative hypothesis β1≠0 is taken to hold implying that the model Y= β0 + β1X1 + e, is significantly fit.

The model performance = α + β (cost) holds for as suggested by the test above. This confirms that there is a positive linear relationship between cost and on performance of supply chain systems in the oil industries. The model performance = β (cost) holds as suggested by the test above. This confirms that there is a positive linear relationship between cost of crude oil and performance of supply chain systems.

The histogram in figure 1 indicates, that there is normality. The residual describes the error in the fit of the model to the *ith* observation $y_{i\ and}$ are used to provide information about the adequacy of the fitted model .Analysis of the residual is frequently helpful in checking the assumption that errors are normally distributed with constant variance, and in determining whether additional terms in the model would be useful. From figure 1 indicates the dispersion of the distribution of a histograms showing the mean, median, and mode give us some measure of the central tendency in a list of numerical data, and the upper and lower figures for the range tells us the high and low scores and the same was observed (Meyer (2010). But in order to understand a set of statistical data more clearly we obviously require a sense of the way in which the measured values are spread out from the central tendency. For example, are the values almost all clustered around the middle, or are there some very low and very high vales. The range and various "averages" tell us something, but they do not describe accurately the distribution of the values.

This objective was assessed using correlation and regression analysis on the local and international registered oil companies' basis and general analysis for

Table 4. Regression Model Summary on Cost of Crude Oil

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.643[a]	.414	.403	.68080

a. Predictors: (Constant), ICT

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	18.316	1	18.316	39.518	.000[b]
	Residual	25.955	56	.463		
	Total	44.271	57			

a. Dependent Variable: performance
b. Predictors: (Constant), ICT

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.168	.083		-2.027	.004
	Cost	.534	.085	.643	6.286	.000

a. Dependent Variable: performance = -0.168 + 0.534 xCost

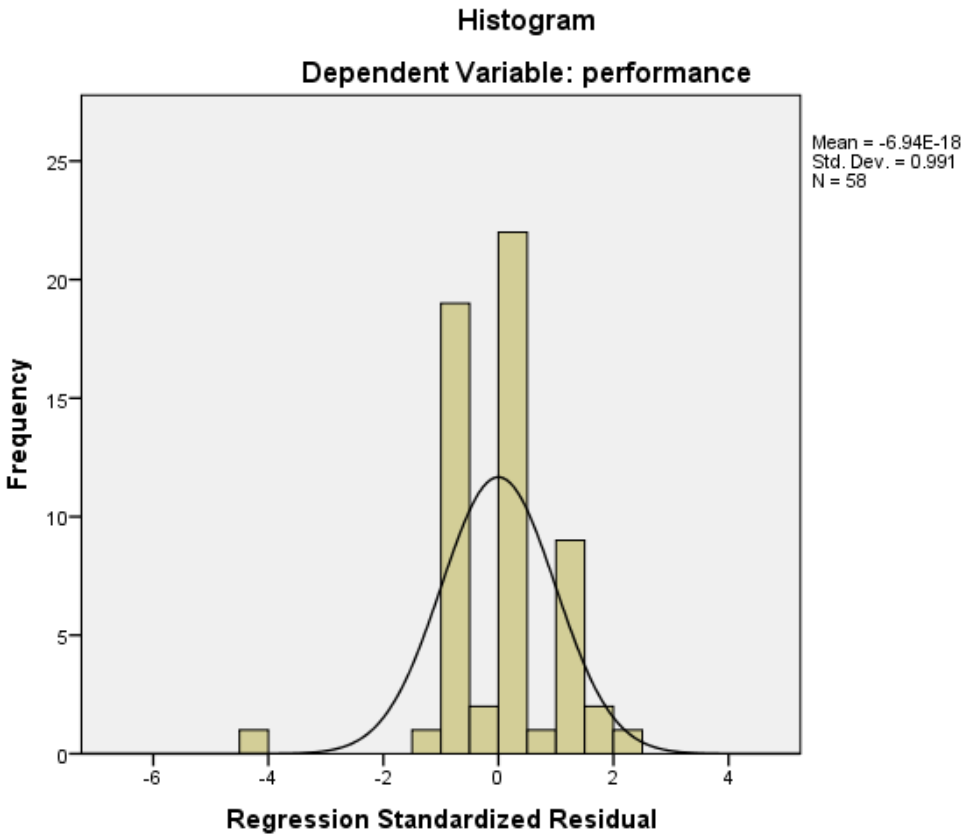

Figure1. Histogram Dependent Variable on Cost of Crude Oil

all the oil companies. At the local level the correlation result indicate that crude oil price is positively and significantly related with level of skills information communication and technology, except at the locally registered oil companies where information communication and technology are not significantly related. The R square value in this case is 0.197 which clearly suggests that there is a strong relationship between the independent variables and the dependent variable. This indicates that the independent variables share a variation of 19.7 % of performance. Comparing with medium unpredictable price.

Table 3 indicates, high unpredictable price compared with medium unpredictable has a significant regression coefficient of (-0.234) with a t-value of -3.557 (p-value =0.001). Low unpredictable price compared with medium unpredictable has a significant regression coefficient of (-0.192) with a t-value of -3.132 (p-value =0.003). Regression analysis result at the local levels indicate that crude oil price contributed to supply chain performance at local registered oil companies (-0.234) with a t-value of -3.557 (p-value =0.001 and also international registered oil companies' ((-0.192) with a t-value of -3.132 (p-value =0.003 but not for the rest of the industry. Further, crude oil price was a stronger predictor of supply chain performance at local registered oil companies. In establishing the influence/performance of crude oil price in the supply chain, a comparison of the local and international registered oil companies revealed different findings. The explanation could be found in the practices which varied per each group. For instance, most of the locally registered oil companies were not ready realize their staff to go for further studies to enhance their understanding in the crude oil pricing. However, in the general analysis, it was established that the effect of crude oil price on performance was not significant (-0.234) with a t-value of -3.557 (p-value =0.001). Significant level in the presence of level of skills, ICT and tendering systems, crude oil price does not affect supply chain performance in the petroleum industry.

In finding based on the general analysis were unexpected because there are many studies indicate that pricing is a predictor of performance of supply chain and they were the hypothesized relationship. The explanation could be because the registered oil companies' are supportive of the crude oil price, as they adjust their prices either up/down wards depending on the crude oil price adjustment. The ultimate customers are the sufferer in this case. This is evident in the findings on descriptive analysis where majority agreed that they were satisfied with the crude oil price for their current job in their respective companies. The interview confirmed that the staffs were supported in their crude oil price terms of supply chain performance. This argument is supported by (Anderson, 2013), who established that while crude oil price may have an impact on staff performance mobility, crude oil price that is wholly paid by an entity is likely to prelude to staff search. In contrast, when supply chain performance for crude oil price the negative relationship to staff mobility is observed as supply chain are more likely to perform. This is in the petroleum industry where the crude oil cost is factored in the retail price to cover the investment cost plus the accrued interest. The relationship between tendering and crude oil price which is in this study is positive and significant provides another explanation is. One cannot acquire crude oil without following the process of tendering systems unless they want to avoid competitive bidding. Therefore, indirectly in away, crude oil price is covered through tendering which has been found to be a predictor of supply chain performance in this study. The hypothesized relationship was not supported, however the unfavourable aspects related to crude oil price that came outing the interview and written responses are a pointer that there are crude oil price aspects that need to be addressed since they cause of non-performance in the supply chain.

SUMMARY

The study established that cost of crude oil affects performance of supply chain systems in the petroleum industries. The null hypothesis was tested through F-test and results indicated that there is a relationship between cost of crude oil and performance of supply chain systems. Pricing is important for any product as it can affect its demand in the market. Many of the world's best business organization would endeavor to sale more at higher price to sustain their trade. That the theory of any affirms when in business. They price products at a reasonable rate to enable them to compete with other sister companies. From the crude oil perspective, pricing products need proper forecasting as customers are always sensitive to any adjustment of price. The study sought to establish the extent to which cost of crude oil affects performance of supply chain systems in the petroleum industries in Kenya.

From the qualitative analysis the respondents were satisfied with crude oil price. This argument is supported by (Anderson, 2013), who established that while crude oil price changes affect supply chain performance throughout transit within the chain, hence crude oil price that is wholly paid by an entity is likely to prelude to customers complaints. In contrast, when supply chain performance for crude oil price the negative relationship to staff mobility is observed as supply chain are more likely to perform.

In the oil companies' regression analysis, crude oil price was found to be a predictor of performance to deliver and shortages in the oil industry. In general multiple regression analysis, the relationship between supply chain systems and crude oil price was significant.

This means that, in the absence of appropriate conducive environment, crude oil can affect performance of the supply chain and they are challenges of performance. The findings, therefore shows that the study which sought to establish determinant effect of cost of crude oil on performance of supply chain systems in the petroleum industries. Further, although crude oil price was a significant predictor in the general analysis for all petroleum companies and hence a challenge to supply chain systems, interview and written response gave a high in depth information on aspects to crude oil that were favourable for the registered oil companies' management performance.

REFERENCE

Anderson, C. (2013), *What is a Quality Management System*? *Bizmanualz*.Retrieved July 03, 2014 from http://www.bizmanualz.com/blog/qualitymanagement-system-qms.html.

207.Association of Oil Marketing Companies (2013). Retrieved from http://aomcs.org.

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

Baumeister, C., Kilian, L., and X. Zhou (2013). "*Are Product Spreads Useful for Forecasting? An Empirical Evaluation of the Verleger Hypothesis," mimeo,* University of Michigan.

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

Caniato, F., Caridi, M., Crippa, L., & Moretto, A. (2012). Environmental sustainability in fashion supply chains: An exploratory case based research .*International Journal of Production Economics*, *135*(2), 659-670.

Chan, R.Y.K., He, H., Chan, H.K., & Wang, W.Y.C.(2012). Environmental orientation and corporate performance: The mediation mechanism of green supply chain management and moderating effect of competitive intensity. *Industrial Marketing management*, *41* (4), 621-630.

Chandan Kumar, Manish Bafna, Ashish Nayyar, VedParkash, Nitin Goyal, "Experimental Investigation of the Performance of VCR Diesel Engine Fuelled by NM-Diesel blend",*International Journal of Emerging Technology and Advanced Engineering,Volume* 4, Issue 8, August 2014

Dacker L. (2013, May). removal-of-petroleum-subsidies.html. *The Daily Graphic* .Retrieved from http://graphic.com.gh/General-News/npa-calls-for-industry.

Delai, I., & Takahashi, S. (2013). Corporate sustainability in emerging markets: insights from the practices reported by the Brazilian retailers. *Journalof Cleaner Production*, *47* pp 211- 221.

Fugate, B., Mentzer, T. and Stank, T. (2010). "Logistics performance: efficiency, effectiveness and differentiation", *Journal of Business Logistics, Vol. 31 No*. 1, pp.43-62.

Giovanni, P.D., & Vinzi , V.E. (2012). Covariance versus component-based estimations performance in green supply chain management. *International Journal of Production Economics*, *135*(2), 907-916.

Johnson, B. & Christensen, L. (2012), *Educational Research: Quantitative, Qualitative and Mixed Approach* (4th ed.). California: SAGE Publications Ltd.

Kojima, Masami 2012. "Oil price risks and/ pump price adjustments*." World Bank Policy Research Working Paper No. 6227.* _http://go.worldbank.org/SIM8QA2VI0_Korkmaz, Selcuk. "Package 'royston'" (PDF). *Cran.r-project.org*. Retrieved 26 February 2014.

Kothari,C.R (2011). *Research Methodology. Methods and Techniques*. New Delhi: New Age International Publishers. (2nd Edition).

Lin, R.J. (2013). Using fuzzy DEMATEL to evaluate the green supply chain management practices. *Journal of Cleaner Production*, 40, 32-39.

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

Liu, S., Kasturiratne, D., & Moizer, J. (2012). A huband-spoke model for multi-dimensional Integration of green marketing and sustainable supply chain management. *Industrial Marketing Management,*41(4), 581-588.

Lun, Y.H.V., (2011). *Green management practices and firm performance*: A case of container terminal operations. Resources, Conservation and Recycling,55(6), 559-566.

Luthra, S., Garg, D. and Haleem, A. (2013) Identifying and ranking of strategies to implement green supply chain management in Indian manufacturing industry using Analytical Hierarchy Process. *Journal of Industrial Engineering and Management*, Vol. 6 No. 4, pp. 930-962.

M. Zhang and B. Huo, "The impact of dependence and trust on supply chain. *International Journal of Physical Distribution & Logistics Management, vol*. 43, pp. 544-563, 2013.

Meyer,D.K. (2010). *Research Methodology. Presentation of data collection Analysis*. Auckland,New Zealand:Viking.

Muhammad Jiyad Shaikh "*IT* Revolutionizing the Supply chain Transformation: A Case Stud of Unilever Pakistan Ltd." *The International Journal of Supply*

Chain Management Vol.2 No. 1, 2013 N. Nordin, "Malaysia: Investment performance January-June 2013" ed: Nasarullah. M and Raja Gopal. K, “Effect of Ethanol and Tetra Nitro Methane on Performance and Emission Characteristics of CI Engine Fuelled With Methyl Ester of Jatropha”, *International Journal of Emerging Engineering Research and Technology Volume* 2, Issue 3, June 2014, PP 31-39.

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

Schrettle, S., Hinz, A., Rathje, M.S., Friedli, T.(2013). Turning sustainability into action:Explaining firms' sustainability efforts and their impact on firm performance *International Journal of Production Economics*.

Sople, V.V. (2012). *Supply Chain Management: Text and Cases.* New Delhi: Dorling Kindersle (India) Pvt. Ltd, Licensees of Pearson education in South Asia.

Styles, D., Schoenberger, H., & Galvez-Martos, J.L.(2012). *Environmental improvement of product supply chains:* A review of European retailers' performance. *Resources,Conservation and Recycling*, 65, 57-78.

Taylor, E. (n.d.).*Differences in Supply Chain Designs for a Manufacturing Industry vs. a Service Industry* Demand Media. Retrieved June 26, 2014 from http://smallbusiness. chron.com/differences-upply chain-designs-manufacturing in industry- vs- service-industry- 14610.htm MHI,“Material Handling Student Design Competition.” CICHME 01 October 2013 http://www.mhi.org/cicmhe / competition, 06-30-2014.

United States. U.S*. Energy Information Administration (U.S.EIA*). OPEC Countries. Washington: Frequently Asked Questions, 2012.

World Bank (2012b). “*Food Price Watch August 2012.* http://siteresources.worldbank.org/_XTPOVERTY/ Resources/336991-311966520397.

Y. Hou, Y. Xiong, X. Wang, and X. Liang, "The effects of a trust mechanism on a dynamic supply chain network," Expert Systems with Applications, vol. 41, pp. 3060-3068, 5// 2014

Yang, C.S., Lu, C.S., Haider, J.J., & Marlow, P.B. (2013). *The effect of green supply chain management on green performance and firm competitiveness in the context of container shipping in Taiwan.* Transportation Research Part E: *Logistics and Transportation Review*, *55*, 55-73.

Zhu, Q., Sarkis, J., & Lai, K.H. (2013). Institutional based antecedents and performance outcomes of internal and external green supply chain management practices. *Journal of Purchasing and Supply Management*, *19*(2), 106-117.

Zhu, Q., Sarkis, J., & Lai, H.K. (2012). Green supply chain management innovation diffusion and its relationship to organizational improvement: An ecological modernization perspective. *Journal of Engineering and Technology Management*, *29*(1), 168-18 e. *Journal of Engineering and Technology Management*, *29*(1), 168-18.