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

Anthony Osoro
PhD Student

Dr. Willy M. Muturi and Dr. Patrick K. Ngugi (Supervisors)
Jomo Kenyatta University of Agriculture and Technology
School of Entrepreneurship and Procurement
P.O. Box 62000-00200, Nairobi, Kenya
Corresponding Author Email: *ansoroh@gmail.com

Abstract- The purpose of the paper was to highlight the challenge affecting performance of supply chain systems. The rise in fuel shortages by firms has precipitated the need for oil companies to realign their supply chain systems with a view of doing proper forecasting. Companies' in the petroleum industry rely on supplying fuel as their key resource inputs in ensuring that they offer better services to the ultimate customers. The paper looks at how oil companies can perform within the supply chain systems in their processes. This is a conceptual paper and the methodology used is analytical data after collection from the sample size targeted by the researcher in which in depth literature review is done to highlight how companies can incorporate performance of supply chain tools in their supply chains systems. The analysis is based on previously conducted research from books and relevant journals and articles. The findings of the paper confirm that oil companies need to implement supply chain systems as a continuous process to achieve sustainability in the supply chain processes. The study concludes that both national and international companies need to enhance the levels of implementing green supply chain practices in managing their operations. This is an emerging supply chain management paradigm that will enable companies to realize long term customer satisfaction through proper forecasting of inventories.

Index Terms- Supply chain performance, Crude oil Price, tendering systems

I. INTRODUCTION

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 (Addy,2012). 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%. The total energy consumption in Africa is 41% of (Petroleum Industry, Wikipedia, 2013).Kenya is on the process of mining the same from the Northern part near Turkana area after successfully drilling numbered of wells as per the Association of Oil Marketing Companies (2013).

1.1: Performance of Supply chain Systems

Integrating supply management with other factors of operations allows all functions to be involved in the management decisions (Tseng & Chiu, (2013). Over the years, the oil industry has continued to face growing challenges, from stricter government regulation, political risks, competition, emergent new comers and political hostilities, which has affected growth and output. 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. 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. The main challenge facing the oil industry is not the availability of oil 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 program will enhance this goal (Bowersor et al (2010).

Iyer (2011), note that despite the vast literature on performance of supply chain in the petroleum industries that has often caused fuel shortages, much less is known about factors affecting proper forecasting. The reasons why there are shortages is not the same as the reasons why we have surplus, a fact that is often overlooked. A recent study by Bowersor et al (2010) and (Maheshwarkar and Sohani, 2013) established that it seems surprising that, to date, no studies have systematically investigated how best to forecast the real price of oil in real time to avoid fuel shortages. One reason is perhaps that there has been no readily available real-time database for the relevant economic variables. Also, lack of proper forecasting, monitoring of stock level, information dissemination from up streams to down streams. In addition, in spite of the great interest in understanding these problems faced by often shortages. The existing literature reveals that there are gaps in terms of generalized conclusion due to a tendency to research on these entire paradigms of supply

chain, challenges affecting performance of supply chain systems in the petroleum industry and the absolute disregard of the professional performance of supply chain systems in the oil companies. Also, (Agami, et al, 2012 and Chan, 2012), observed that a previous empirical finding shows that internal supply chain performance measures have lacked precision and consistency. (Alquist et al. 2013) argues that many researchers have only focused on financial performance measures at the expenses of forecasting accuracy. It is insufficient to merely analyze a company's performance by financial, especially under today's changing volatile supply chain systems/environment.

1.2.General Objectives: The general objective of this study was to establish the challenges affecting performance of supply chain systems in the petroleum industries in Kenya; Specific Objectives; To establish the extent to which cost of crude oil affects performance of supply chain systems in the petroleum industries in Kenya; To examine the effect of tendering systems on performance of supply chain systems in the petroleum industries in Kenya; To determine the moderating effect of legal and regulatory environment in the oil companies on the, relationship between level of skills, information and communication technology, cost of crude oil and tendering systems in the oil industries in Kenya.

II. LITERATURE

2.1: Supply Chain Performance Measures

A company needs to have performance measurements to be able to evaluate the efficiency of the Supply chain. Taylor (2014), states that you can't manage if you can't measure. Barrow (2013), observed that companies have to achieve both cost leadership and service leadership to have an efficient Supply chain. If a company only measure internal performance measurements as for example order handling time and yield in production the measurements can't be used for evaluating the efficiency in a company. (Shatina et al, 2014) also claimed that most of the supply related performance measurements have an internal focus and do not measure how the company drives profitability. If this still is valid there is an indication that there is a gap of measuring efficiency. This research will evaluate the performance measurements in the Supply chain of oil companies used today and identify if performance efficiency can be measured. An important component in supply chain design and analysis is the establishment of appropriate performance measures ((Lin, 2013). A performance measure or a set of performance measures is used to determine the efficiency / effectiveness of an existing system, or to compare competing alternative systems. Performance measures are also used to design proposed systems, by determining the values of the decision variables that yield the most desirable level(s) of performance. Available literature identifies a number of performance measures as important in the evaluation of supply chain effectiveness and efficiency (Schrettle et al, 2013).

The performance prism framework suggests that a Performance Measurement Systems (PMS) should be organized around five distinct but linked perspectives of performance (Tseng, & Chiu, 2013). Stakeholder satisfaction (Who are the stakeholders and what do they want and need?); Strategies (What are the strategies we require to ensure the wants and needs of our stakeholders?); Processes (What are the processes we have to put in place in order to allow our strategies to be delivered?); Capabilities (The combination of people, practices, technology and infrastructure that together enable execution of the organization's business processes, both now and in the future, and what are the capabilities we require to operate our processes?) and Stakeholder contributions (What do we want and need from stakeholders to maintain and develop those capabilities?). The performance prism has a much more comprehensive view of different stakeholders (investors, customers, employees, regulators and suppliers) than other frameworks. Giovanni & Vinzi (2012) argues that the common belief that performance measures should be strictly derived from strategy is incorrect. It is the wants and needs of stakeholders that must be considered first. Then, the strategies can be formulated (Lin, 2013). Thus, it is not possible to form a proper strategy before the stakeholders and their needs have been clearly identified. In this way, the framework ensures that the performance measures have a strong foundation. The performance prism also considers new stakeholders (such as employees, suppliers, alliance partners or intermediaries) who are usually neglected when forming performance measures.

Oil Pricing

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 (Billy Gray et al,2023). 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. 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). Chadha & 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).

2.4: Cost of Crude Oil

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 organizations (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) they 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 *Daily Graphic* (2013). 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 (Chiouet al, 2011).

2.5: Tendering Systems

Procurement encompasses the whole process of acquiring property and/or services. It begins when an agency has identified a need and decided on its procurement requirement. Procurement continues through the processes of risk assessment, seeking and evaluating alternative solutions, contract award, delivery of and payment for the property and/or services and, where relevant, the ongoing management of a contract and consideration of options related to the contract. Procurement also extends to the ultimate disposal of property at the end of its useful life (Gavronski, 2011).Sound public procurement policies and practices are among the essential elements of good governance (Hoejmose, 2012). Giovanni & Vinzi (2012) notes the irregular procurement

activities in public institutions provide the biggest loophole through which public resources are misappropriated. According to Lin, (2013), the basic principles of good procurement practice include accountability, where effective mechanisms must be in place in order to enable procuring entities spend the limited resources carefully, knowing clearly that they are accountable to members of the public; competitive supply, which requires the procurement be carried out by competition unless there are convincing reasons for single sourcing; and consistency, which emphasizes the equal treatment of all bidders irrespective of race, nationality or political affiliation. Mirhedayatian et al (2013) who established that process should also uphold integrity by ensuring that there are no malpractices; informed decision-making, which requires public bodies to base decisions on accurate information and ensure that all requirements are being met. More still, the Procurement practice should be responsive to aspirations, expectations and needs of the target society. Finally, there is need for transparency to enhance openness and clarity on procurement policy and its delivery (World Bank, 2007).

2.6 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 variables; skills, information and communication technology, cost of crude oil and tendering systems 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. 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) & (Fugate et al, 2010). 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) and (Gist,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).

3.1 Research Design

The aim of the study was to establish the challenges affecting performance of supply chain systems in the oil companies in Kenya and to achieve this, a researcher used descriptive research design, (Meyer,2010) states that descriptive studies are more formalized and typically structured with clearly stated evaluative questions. It serves a variety of research objectives such as descriptive of phenomenon or characteristics associated with a subject population, estimates of proportions of population that have these characteristics and discovery of associations among different variables. 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). Mugenda and Mugenda (2003), states that 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). As noted in Creswell,(2009) mixed research is an approach that combines or associates both qualitative and quantitative research methods: Enables mutual corroboration of each other via the use of multiple sources of collecting data, contextualizes the analysis by providing richer details and initiates new lines of thinking through attention and surprises, turning ideas around and providing fresh insights.

3.2: Sample and Sampling Techniques

A census of all the registered 73 oil companies was conducted. This involved all heads of procurement in all the registered oil companies, which finally resulted to our unit of observation. The purpose of sampling is to secure a representative group which enabled the researcher to gain information about a population. The researcher carried censuses to all the 73 registered oil companies as per ERC records. Kothari (2011) and (Carver, 2009) observes that a census with population of 100 per cent response rate has an advantage over a sample in that there are no concerns as to whether the people who take part are representative of the population. Total population sampling is a type of purposive sampling technique where you choose to examine the entire population that have a particular set of characteristics such as specific experience, knowledge, skills, exposure to an event. In such cases, the entire population is often chosen because the size of the population that has the particular set of characteristics that you are interest in is very small (Meyer, 2010).

III. Discussion

Findings on the Effect of Performance on the Cost of Crude Oil

Majority 21.92% of the respondents indicated that they were not aware what was the really cost of crude oil in the international market. Similarly, on average 78.08% indicated that their current oil companies were not aware of the pricing procedure as it's stipulated in the Public Procurement and Disposal Act 2005 (see Table 3.1).

Table 3.1: Cost of Crude Oil

Statements	expert	experience.	Qualification	current crude cost
Range 1-10	yes	5	degree	n/a
Range 11-20	yes	5	degree	n/a
Range 21-30	no	0	0	n/a
Range 31-40	no	0	0	n/a
Range 41-50	yes	3	degree	n/a
Range 51-60	no	2	diploma	n/a
Range 61-70	no	8	diploma	n/a
Range 71-80	yes	13	diploma	n/a

O= less than diploma, n/a = not applicable

3.4: Findings on the Effect of Performance on Tendering Systems

A significant percentage 48.1% disagreed that the tendering systems is a professional system, where competent personnel requires clear guideline to execute their responsibility. A significant percentage of 62.3% agreed that what is stated in the tendering systems was apt always but not conundrum

On average 80% of the respondents indicated that they apply open tendering method, agreed that open tendering systems is the most recommended methods both in private and public sector and 79% agreed that what id stated in the Public Procurement and Disposal Act 2005 acts as an Indicators of performance in the supply chain systems in Kenya. These finding are in tandem with (Schrettle et al, 2013), who established that majority of staff felt that tendering systems was based merit. High percentage of 74% agreed that the tendering systems are the criterion over proper forecasting and expatiating the lead time after placing an order. This tallies with the findings that majority 69% agreed that the tendering systems were paramount to success in the present volatile world of business.

3.5: General Correlation Analysis Matrix for all Registered Oil Companies' Kenya

From the correlations matrix, all the independent variables had a negative but significant relationship with the independent variable (see Table 4.16).Level of skills, information and communication technology, crude oil price and tendering systems with performance on the supply chain systems. Performance on supply chain was negatively and significantly related to level of skills ($r= 0.615, p< 0.001$), to information and communication technology (;$r= - 0.398, p< 0.001$), to crude oil price ($r= -0.397, p< 0.001$), and to tendering systems ($r= -.0.402, p< 0.001$) significance level (see Table 3.4).

Table 3.4 General Correlation Analysis Metrix for all Registered Oil Companies' Kenya

Variable	Pearson Correlation	performance (X1)	level of skills (X2)	ICT (X3)	crude oil price	tendering systems (X4)
Performance of SC	Pearson Correlation	1	-512**	-307**	-402**	-480**
	sig.(2-tailed)		. 000	.000	.000	.000
	n	544	544	544	542	542
Level of skills (XI)	Pearson Correlation	-512**	1	.589**	.615**	608**
	sig.(2-tailed)		.000	.000	.000	.000
	n	544	547	546	544	543
ICT (X2)	Pearson Correlation	-307**	580**	1	.526**	.558**
	sig.(2-tailed)		.000	000	.000	.000
	n	544	546	546	544	543
Crude oil Price (X3)	Pearson Correlation	-402**	.615 **	.526**	1	.643**
	sig.(2-tailed)	.000	.000	.000	.	000
	n	542	544	544	544	542
Tendering Systems (X4)	Pearson Correlation	-480**	.608**	.558**	.643**	1
	sig.(2-tailed)		.000	.000	.000	.000
	n	543				

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

When correlated among themselves, all were found to be associated. Information and communication technology was positively and significantly related to level of skills (r= -0.512,p< 0.001) at 0.01 significance level. Cost of crude oil was positively and significantly related to level of skills (r = 0.397,p < 0.001) and to information and communication technology (r =0.307,p < 0.001) at 0.01 level of significance. Tendering systems was positively and significantly related to level of skills (r =- 0.480, p < 0.001, to information and communication technology (r =--0.402,p < 0.001), and also to cost of crude oil (r =0.402,p < 0.001) at 0.01 significance level. Evidently, the relationship between tendering system and supply chain performance had the highest coefficient (r = -0.512,p< 0.001) with the lowest being information and communication technology and supply chain performance (r = -0.480,p< 0.001).

Therefore, from this result, all the variables have a responsibility to play in supply chain systems and performance. Further, the interdependence between the variables is also an indicator that all variables explain performance on supply chain systems at Premium petroleum Ltd, Nairobi. Its noted that there is a strong significant relationship between tendering systems and cost of crude oil which is normally follows because additional crude oil price often lead to poor forecasting on tendering systems. The independent variable Were also tested to establish their interdependency and the result shows a positive and significant relationship crude oil price had a positive significant relationship with level of skill (r = - .0.589, p< 0.001) at significant level. Tendering systems had a positive and significant relationship with level of skills (r =.615, p< 0.001) and with crude oil price (r = 0.526,p< 0.001) at significant level. Performance was significantly related to level of skills (r = 0.608,p< 0.001) to crude oil price (r = 0.558,p< 0.001) and to tendering systems (r = 0.643,p< 0.001) at significant level.

From these findings the null hypothesis that correlation coefficient is equal to zero is rejected since the entire variable are correlated; hence there exist a significant relationship. These results imply that further statistical analysis can be carried out such as regression analysis. Further, the result indicates that while some of the factors may have higher influence on performance, balances between all these factors are necessary for optimal performance of the staff. The correlation results also rule out the problem of multillinearity which arises in regression analysis in that none of the independent variables were highly correlated. A common rule of thumb is that correlations among the analysis (Agami et al, 2012).

From the correlation results of local and international registered oil companies' in Kenya, it is evident that all the independent variables had a positive relationship with one another with all these relationship having a p – value=0.001 significant at 0.001 significant level except some local oil companies where tendering systems and crude oil prices were not significantly related (r = 0.264,p< = 0.001). The result therefore indicates that most of the local registered oil companies' are predictor variables (level of skills, crude oil price and tendering systems and performance) are related to information communication and technology. Further, the correlation results indicate that while some of the factors may have high input to decreasing the performance to supply chain to balance forecasting to all factors necessary for optimal performance of the staff. It is also, evident that all the independent variables have a significant relationship with staff performance measured using supply chain systems to leave except in local registered oil companies' where level of skills and information communication and technology to leave are not significantly related (r =-0..237,p< = 0.56) and also local where tendering systems and intention to leave are not significantly

related(r = -0.143, p= 0.379). All have an inverse relationship which means that when each of the variable increases the intention to leave decreases. This implies that if this oil companies' can enhance level of skills, ICT, crude oil price and tendering systems performance's intention to leave among the staff will decrease, hence they will be able to do proper forecasting of stock level from the supply chain up streams to down streams.

Multiple regression analysis explains the variations in a dependent variable because of the independent variables and this is analyzed using the coefficient of performance known as R Square and the larger the coefficient, the larger the effect of the independent variable upon the dependent variable . The R Square can range from 0.000 to 1.000, with 1.000 showing a perfect fit that indicates that each point is on the line (Styles et al, 2012). The coefficient or beta (β) weights for each variable allows the researcher to compare the relative importance of each independent variables. In this study the unstandardized coefficient and standardized coefficient are given for the multiple regression equations. However discussions are based the standardized coefficient.The general model was subjected to testing using multiple regression (stepwise method) registered oil company by company to establish whether each company has its own forecasting on performance of the supply chain systems.

The correlation analysis indicated that there was a positive significant relationship between crude oil price and shortages of fuel in most of the oil companies. Crude oil price was also strongly correlated with retail pricing of fuel, hence shortages. Majority, (41 %) indicated that the crude price is the cause of often shortages. From, the correlation analysis on company's basis, crude oil prices has a positive significant which was affecting to all petroleum companies. The implication of this is that cheaper prices would enhance service delivery practices were favourable less the intention to leave. 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 presence of level of skills, tender systems, 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 the extent to which cost of crude oil affects 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.

Tendering systems is viewed a process of upholding integrity by ensuring that there are no malpractices; informed decision-making, which requires public bodies to base decisions on accurate information and ensure that all requirements are being met. For any oil company to succeed it must adhere to forecasting of their stock levels. Majority (48.1%) preferred alternative method of tendering. Most of the oil company placed their order on the national tenders and they were convinced that they were above 60% effective in service delivery. The only measures they indicated they had was the ERC guidelines on every mid of the month they revise their prices by either increasing or decreasing. Therefore, the study sought to find out whether tendering systems affect performance of supply chain systems in the petroleum industries in Kenya.

From the descriptive analysis, it was established that on average (34 %) the respondents did not have measurement of transparency in place when it comes to tendering systems since they do direct replenishment of their fuel order. In addition (80%) indicated that the criterion of measuring transparency was unclear. A high percentage (74%) indicated that lack of adequate measures was the main reason that contributed to lack of transparency. From the qualitative analysis, majority of those who had left cited lack of transparency as the major factor that affected performance of supply chain. Another one was the government .involvement by directing all import to be done by a particular company. Majority of the respondents (81 %) indicated that petrol price was higher in all petroleum companies, as it was the nub and core to personal cars. Only 61% believes that the government was concern for production in the local industry by reducing diesel price. The practice of reducing diesel to prevent a paradigm shift of industries to other countries for investment The senior procurement officers in charge of procurement confirmed that ring fencing was done especially in regard with international companies that was not easy to find after relocation, but also added that such cases were rare.

3.6: Conclusions

The study was set out establish the challenges affecting performance of supply chain systems in the petroleum industries in Kenya. The study generally concluded that mixtures of challenges affect performance of both national and international ERC registered oil companies. These were either intrinsic and extrinsic variables influence intention to leave of employees a s exemplified by level of skills which is an intrinsic and crude oil price as extrinsic variable which were identified as predictors of service delivery through supply chain systems. The study further concluded that current trends such as timeliness forecasting, proactive stock level management, IT, just in time delivery and e-procurement has not been well embraced by the registered oil companies. Most of these companies' as confirmed from qualitative data, did not have performance policies or strategy and hence had not made performance of their staff apriority despite the current market competition in the level of skills. Finally, the needs to emphasize the importance of e- sourcing throughout the supply chain systems so as to achieve a competitive in the business markets.

Chadha and Gagandeep (2013) established that there are basically three functions attributed to (supply chain) performance indicators (SCPI):

• Information functions in order to inform management, support decision making and to identify problem areas;

• Steering function in order to set targets and give directions to desired outcomes;

• Controlling function in order to supervise process execution.

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AUTHORS

First Author – Anthony Osoro, PhD Students, Jomo Kenyatta University of Agriculture and Technology, School of Entrepreneurship and Procurement, P.O. Box 62000-00200, Nairobi, Kenya, Corresponding Author Email: *ansoroh@gmail.com