

FACTORS AFFECTING THE EFFECTIVENESS OF THE SUPPLY CHAIN OF SUBSIDIZED FERTILIZER IN KENYA: A CASE STUDY OF THE NATIONAL CEREALS AND PRODUCE BOARD

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ABSTRACT

The supply of subsidized fertilizer in Kenya has raised public concerns due to chronic lateness and inadequate supply to vulnerable farmers even after sufficient quantities have been tendered for and procured into the country by the Government of Kenya through the National Cereal and Produce Board. Further, reports of smuggling, diversion for commercial trade, and irregular tender awards have been rife. This ultimately affects fertiliser application leading to some farmers foregoing or applying inadequate fertiliser. The ultimate effect is reduced food production. This prompted the study of factors affecting the effectiveness of the supply chain of subsidized fertilizer in Kenya with the following key variables of study: Procurement process, distribution system, Information technology and ethical issues. The study adopted a case study approach informed by the fact that the subsidy program, which has a national outlook, is implemented by only one organisation, the NCPB. The main objective of the study will be to examine the factors affecting the supply of subsidized fertilizer. A descriptive research design using questionnaires collected data from 59 respondents, from the six regional offices which oversee operations of all depots. The collected data was edited, coded and entered for analysis using the computer statistical package (SPSS). The research established that the research model predicts 52.6% of the effectiveness of the supply chain of subsidized fertilizer. The report also recommends improvements in the management of procurement process, the distribution system as well as Ethics and IT since these have been found to have a great and moderate effect, respectively, on the effectiveness of the supply chain of subsidized fertilizer. Further, the report recommends study on other factors that affect the effectiveness of the supply chain of subsidized fertilizer.

Key Words: *effectiveness of supply chain, subsidized fertilizer, Kenya, National Cereals and Produce Board*

Introduction

Most developing countries in the world experience perennial food shortage (Duflo E. , 2009). Consequently, African heads of state declared support for increasing quantity of fertilizer used by farmers from about 8 to 25 kg/ ha. (Chianu *et al* 2008). The Republic of Kenya (ROK) embraced various strategies to stimulate fertilizer usage among farmers including liberization of fertilizer trade. Minde& Jayne (2008) elucidate that owing to high prices experienced since 2007 in world prices, Kenya, like other African governments, revived fertilizer subsidies to ensure availability to poor and vulnerable farmers. Since 2008, it is estimated to cost 14 billion yearly (MOA 2012)

The oxford dictionary defines subsidies as a sum of money granted by the state to help an industry keep the prices of a commodity or service low. Fertilizer subsidy as defined by Bates (1981) is the government intervention in fertilizer supply to maintain stable and low prices for the benefit of poor farmers. Evaluation of the history of fertilizer subsidy in Africa, contained in a report by Minet& Tod (2011), shows that the period between 1960s and 70s was characterized by universal fertilizer subsidy at prices between 20 to 60 percent of the full market costs, imported and distributed by Parastatals which enjoyed monopoly such as the national cereals and produce board and the tea board in Kenya. The subsidy programs, according to Jonathan & Dorwar (2010) suffered multiple problems that led to delays and high costs in delivery of fertilizer to farmers.

The inhibitive cost of maintaining such inefficient programs led to departure from such programs in almost all African countries. Kenya liberated its fertilizer markets in the 1980s to the year 2007 when factors such as high prices reignited interest among African governments in subsidies. Unprecedented high food and fertilizer world prices, coupled with post election violence disturbances on the agricultural value chain in Kenya led to an even more intense interest in subsidies by the Kenyan government to support subsistence farming by poor and vulnerable farmers in a bid to spur food production. Subsidized fertilizer is sourced from the world market through international tendering and distributed to vulnerable farmers by the national cereals and produce board using a targeting distribution system (Ministry Of Agriculture, 2012)

Supply Chain of Subsidized Fertilizer

Chopra, Sunil & Meindl (2004) defines a supply chain as the collective term defining all parties involved, directly or indirectly, in fulfilling a customer's request. This definition is consistent with that of Narguney (2006) who defines a supply chain as a system of organizations, people, activities and information involved in moving products and services from supplier to customer. Information from the national cereals and produce board (NCPB, 2013) website, (www.ncpb.co.ke/index.php) shows that Subsidized fertilizer in Kenya is sourced internationally through international tendering, a process managed by the National Cereals and Produce Board of Kenya(NCPB) and distributed by the government through a network of the board's depots

managed by its six regional offices, to farmers across the country through a targeting system (NCPB, 2013). The organizations involved in the supply of subsidized fertilizer thus include; International Supplier, NCPB, and NCPB depots, and ultimately the farmer.

Diagrammatical representation of this supply chain would be as shown in figure 1 below:

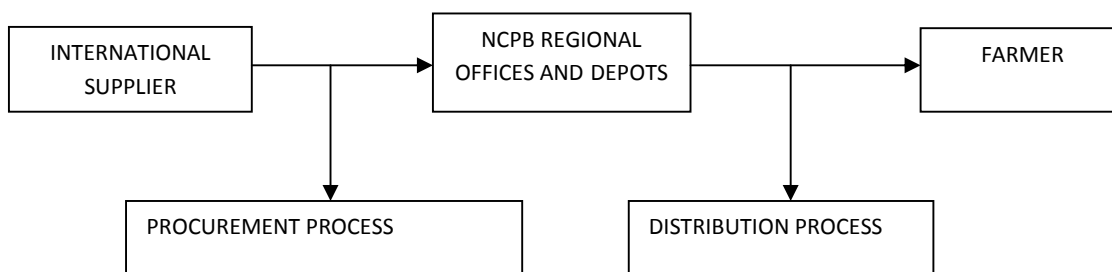


Figure 1.1: Supply Chain of Subsidized Fertilizer

Gregory (2004) asserts that in all recent input subsidy programs in Africa such as in Malawi, Ghana, Nigeria and Kenya, the supply chain's distribution system normally includes a mechanism for qualifying recipients of the subsidy, usually the vulnerable and poor farmers. In Kenya, This allows assessment of a farmer's need by the government through the agricultural extension office who give the 'vouchers' indicating the farmers need for redemption at NCPB at the subsidized price. The new generation of input subsidies ('smart' subsidies) brings innovations in design (targeting) of a distribution system to support the most constrained farmers. Available evidence, albeit very limited, suggests that such programs have been effective in raising fertilizer use, average yields and agricultural production but that their success is highly dependent on management of various activities involved in supplying the fertilizer, to ensure that it is supplied in time for farming at the right quantity to the right farmers (Dorward & Chirwa, 2011)

The National Cereals and Produce Board

The origin of the national cereals board, according to information posted in its website in May 2013 (<http://www.ncpb.co.ke/about>), can be traced back to the early 20th century when farmers, mainly European, formed communities which later developed into regional marketing boards to assist them procure and market inputs and produce respectively. In 1939, the colonial government formed the maize and produce control board to regulate these boards. The board has since evolved to become the current national cereals and produce board with the core tasks of; commercial grain trading, fertilizer and seeds procurement and distribution, maintaining a strategic grain reserve and facilitation of famine relief, through its vast network of 98 depots across the country.

The national cereals and produce board is key in the implementation of the fertilizer subsidy program since 2007, charged with the procurement and distribution of the fertilizer. Statistics available from the Ministry of Agriculture shows that the board imports over 450 metric tons of fertilizer under the subsidy program every year through international tendering since Kenya does not produce inorganic fertilizer (Ministry Of Agriculture, 2012). The fertilizer is distributed from the 98 boards depots spread across the country. Unrelated reports, for example by Kirima & Kwama (2012) however raise concerns of late procurement, diversion for commercial trade and inadequate and late supplies in areas considered as the food basket of the country .

Statement of the Problem

Joshua (2009) states that the high prices coupled with coupled with civil unrest in major farming regions in Kenya at the height of the post election violence of 2008 negatively affected the vulnerable agricultural value chain and consequently raised government interests in fertilizer subsidy as one of the measures to safeguard poor and vulnerable farmers. Statistics available from the Ministry of Agriculture show that the subsidy cost over Ksh14 billion yearly (Ministry Of Agriculture, 2012).

Farmers across the country have raised pertinent issues related to the subsidized fertilizer supply chain. According to the Kenya farmers association (KFA 2013), the fertilizer has consistently been supplied to farmers late and in insufficient quantities since inception of the program in the year 2008. Fertilizer meant for small scale farmers has been repackaged for commercial sale in parts of the country. This means that poor and vulnerable farmers, who produce over 40% of the country's food requirement, either apply fertilizer in insufficient quantities or non at all (Duflo, Esther, Michael, & Jonathan, 2008)

This has led to reduced yields. For instance, Tegemeo Institute of Egerton University (2013) attributes 35% reduction in maize yields in Kenya to poor subsidized fertilizer supply. Malawi's removal of fertilizer subsidies was followed by a famine; the country reinstated a two-thirds subsidy on fertilizer. This was followed by an agricultural boom which many, including Jeffrey Sachs, attribute to the restoration of the fertilizer subsidies (Dugger, 2007). Previous trials with small scale poor farmers on their own farms in a region of Western Kenya where fertilizer use is low showed that, when used in limited quantities, fertilizer generates 70% annual returns, on average (Duflo, Kremer, & Robinson, 2008), even without other changes in agricultural practices. Such high returns are at risk with delay and inadequacy of affordable fertilizer for the small scale farmers.

A study in Malawi by Chirwa, Mirriam & Andrew (2011) outlined the factors influencing access to input coupons but fell short of explaining explicitly the factors affecting the supply of subsidized fertilizer. Other studies related to subsidized fertilizer include studies by Druile & Hurle(2012) and Nicholas& Todd(2009) that examine the size of fertilizer subsidies while simultaneously justifying the need for subsidies in Africa. This study sought to study the factors affecting timely and adequate supply of subsidized fertilizer in Kenya.

Overall Objective

The broad objective of the study was to examine the factors that affect the effectiveness of the supply chain of subsidized fertilizer in Kenya.

Specific Objectives

1. To establish the effect of procurement process on the effectiveness of the supply chain of subsidized fertilizer in Kenya.
2. To ascertain how the distribution system affect the effectiveness of the supply chain of subsidized fertilizer in Kenya.
3. To find out how Ethical issues influence the effectiveness of the supply chain of subsidized fertilizer in Kenya
4. To assess the impact of IT on the effectiveness of the supply chain of subsidized fertilizer in Kenya

Theoretical framework

Kerlinger (1986) defines a theory as a set of interrelated principles and explanations that present a systematic view of phenomenon by specifying relationships between identifiable variables, and includes basic assumptions and axioms forming the basis for such relationship, which can be empirically examined. As such, theories provide researchers deeper understanding and basis for studying natural phenomenon.

Theory of Constraints on Supply Chain

By far the most popular approach to supply chain management is Goldratt's Theory of Constraint (TOC) (Triestch 2005). The theory of constraints is a management paradigm that views any manageable system as being limited in achieving more of its goals by a very small number of constraints and as such TOC uses a focusing process to identifying the constraints and restructure it to realize more through put through the system (Triestch, 2005). This is in line with the views of an earlier propagator of the theory of constraint, Mewes (1963), who identified bottlenecks as underlying inefficiencies of most processes.

The theory of constraints is based on the premise that the goal achievement by a goal oriented system is limited by at least one constraint (Triestsch 2005; Cox , Jeff , Goldratt , & Eliyahu 1986). Only by increasing flow through the constraint(s) can overall output be increased and the objectives of the system realized (Goldratts, 2004).

Assuming the goal of the system has been articulated and its measurement defined, the steps include identifying the systems constraint, deciding how to exploit the constraint, subordinate everything else to align the whole system and make changes (Goldratt 2004) .Constraints according to Noreen, smith & Mackey (1995) can be external or internal to the system and include such phenomenon as constraints of equipment, policy and regulation, lack of skilled people The theory of constraint has been used in the supply chain management to provide solution towards greater availability and flow of inventory by identifying constraints such as, and

offering management techniques to reduce, replenishment time, lead time, and late deliveries (Herman 2000). Any improvements in such areas will improve availability of products and services to customer.

General Systems Theory on Supply Chain

The general systems theory was developed initially by Von Bertalanffy(1969) in the field of biology and extended by Weinberg(1975), Miller(1978) and Yourdon (1989) into paradigms of management (Rudolf, 2011). Bertalanffy (1969), a biologist who through his work on general body systems found that given the interaction between a system's components, a system was often more than just the mere sum of its components; it involves the interaction between components, differently, within the larger system. Miller(1978) argued that in most cases, real world systems are open systems which interact with, and are often influenced by, the external environment.

Another important concept of a system is the definable boundary that separates a system from its environment and allows inputs to and outputs out of the system (Rudolf, 2011).The general systems theory according to Rudolf (2011) identifies four general systems principles. These principles are; The more specialized or complex a system is, the less adaptable it is to its environment, the larger the system, the more the resources are required to support the system, systems often contain other systems, and are in themselves components of larger systems and systems grow proportionally to resources allocated to the system.

Supply chains are considered systems of providing flow of good, product or services to consumers (Chopra& Meindl 2004). The contribution of the general systems to supply chain can be seen from this view point that the supply chain is a system with inputs and expected outputs, to inform management of supply chain. Handfield& Nicholas (1999) explains that, within the context of the general systems theory, the supply chain includes the management of information systems, sourcing and procurement systems, logistics systems, order and customer service systems and integration of these activities through improved relations between these systems can be used to gain competitive advantage. The general systems theory provides opportunity to distinguish subsystems and variables that operate within a supply chain leading to a better understanding of the dynamics within the supply for better study and improvements

Total Quality Management

According to Arora (2002) Total Quality Management (TQM), a buzzword phrase of the 1980's has been killed and resurrected on a number of occasions. The concept and principles, though simple seem to be creeping back into existence by "bits and pieces" through the evolution of the ISO9001 Management Quality System standard. The term first appeared in 1961, when it was devised by Feigenbaum, who named it as total quality control (TQC).

Beginning from 1950, scholars like Deming, Juran and Crosby, taught for more than forty years, quality ideas without using the adjective 'total'. In 1988, with the creation of the European

Foundation of Quality Management, the importance and value of TQM was stressed to 'reach total customer satisfaction' Feigenbaum, the originator of the term, defines TQM as the 'Total Quality Control's organization wide impact'

Trent (2001) asserts that the focus of modern quality view is the process quality management but not the product itself (traditional quality view). Consistent with this view, Stanley and Wisner (2001) elucidates that In each step of supply chain, there are many correlative processes, such as procurement, logistics, production, inventory, selling, service, etc. These processes have their own independent objectives and programs. There are usually conflicts among the objectives and programs. Therefore, the processes and their mutual effects should be identified and managed to ensure the harmonious operation of supply chain. Then, all the processes, especially the key processes, can realize high quality, i.e. small variation, small waste, and more increment, through the continuous improvement and total quality control in all the nodes of supply chain system.

In this modern view of TQM, processes should be designed and continually improved to align to the most important goal; customers' satisfaction, only satisfied customers come back and bring more business. (Besterfield 1999) Customer satisfaction in the context of TQM has mostly been viewed from the view point of profit generation by business enterprises; where market prices are largely absent, or skewed. Research suggest that customer satisfaction principles have considerable potential to transform vulnerable groups, by various governments who are largely into service delivery and essential products, devoid of profit motive(Reh 2006) .

Heinzman & Marson (2006) assert that the absence of profit motive in the public sector doesn't mean that satisfaction is unimportant in public sector; on the contrary, service satisfaction is a strong driver of citizen trust and confidence in public institutions.

Empirical Review

Supply Chain effectiveness

Chopra, Sunil & Meindl (2004) defines a supply chain as including all functions involved in receiving and fulfilling a customer request. Similarly, Hertz (2001) defines a supply chain as a network that supplies a specific product from raw material to final product. Hertz (2001) goes further to state the common objective of any supply chain as efficiency and effectiveness. Efficiency is an internal standard of performance while effectiveness is an external standard of fit to various groups demands.(Pfeffer &Salancik 1978). For the purpose of this study the researcher will focus on effectiveness

Effectiveness by definition is a qualitative measure set by an evaluator; the evaluators here refer to customers. The concept of effectiveness according to Moller and Torren(2003) is an actors ability to produce solutions that provide value to markets(customers). A related, but a more specific concept of effectiveness is given by Hines et al. (2000) who define organizational effectiveness as an external standard of how well an organization meets the demand of various groups that are concerned with its activities. Supply chain effectiveness is equalized, by Gunasekaren, Patel and Tirtiro(2001), to the level to which organizations involved in delivering

value to customers create customer satisfaction by delivering the right product offering at the right time at the right place.

Ralph(2000) established that in order to achieve the supply chain validity of outcome (effectiveness; delivering the right product offering on time, to the right groups and at the right place (Gunasekaren, Patel& Tirtiro 2000), all barriers to free flow of products from the supplier to user must be removed. Ineffective supply chains are loosely integrated with poor management of existing interdependencies (Hertz 2001). These interdependencies refer to the management, and coordination, of activities and functions, individually and collectively, involved in acquisition of raw materials to the point final product is delivered to customer.

Various authors have studied supply chain performance from different points of view. According to Lee & Corey (1995) supply chain performance is contingent on its ability in conversion of procured raw materials into finished goods and delivery to consumers through a distribution system. This manufacturing orientation is consistent with studies of supply chain by (Hertz 2001, Ganeshan & Harrison 1998, Scott& Westbrook 1991). Christopher (1998) in his study asserted that supply chain performance is a factor of linkages, that is, the supply chain is a network of organizations involved in the different process and activities that produce value inform of products and services to customers, and how well this objective is met is determined by how these links in activities and processes is managed.

Paul *et al* (2006) study conceptualized improving the effectiveness of supply chain through purchasing management. In his study (Paul *et al* 2006) identifies purchasing planning, supplier collaboration, supplier base rationalization and nature of supplier relationships as major valuables predicting supply chain performance. The study by Neves *et al* (2001) & Davidrajuh(2005) on the other hand lay importance on distributing the processed goods, to customers. Their study proposed distribution channel planning model.

Srivastava& Srivastava(2006) explored use of an iterative approach for designing distribution chain in an agile environment and proved that distribution agility of the supply chain is necessary to enable achievement of supply chain core objectives of enabling firms achieve competitiveness.

Braganza (2002) and power (2005) noted that supply chain design; the level of effective integration of several functions at different organization levels is what achieves results. Moreover, Lalwani *et al*(2006) suggested that the current development in systems thinking and continuous system simulation when applied to supply chain management and practice may offer good design of the supply chain and ultimately enhance supply chain performance. Mentzer *et al* (2001) approaches supply chain management as the strategic and systematic coordination of the traditional business functions within a particular firm and across business within the chain for the purpose of achieving value for customers, effectively and efficiently. This approach is consistent

with that of Chopra & Meindl (2001) that established that supply chain performance is resultant of all stages involved directly and indirectly, collectively, in fulfilling a customer's request.

Despite the fragmented approach and view points to supply chain management and supply chain performance, researchers have noted a number of problems regarding supply chain activities (Sridharan *et al* 2005). It's observed that either the system or subcomponent of the supply chain is malfunctioned or poorly designed (Spenn & Bersk 2002). Mentzer *et al* (2001) and Fawcett *et al* (2005) findings are consistent with Sridharan *et al* (2005) that supply chain performance is inhibited by barriers within or with the chain.

These barriers according to Fawcett *et al* (2008) range from poor supply chain planning and design, misaligned supply chain processes and structures, supply chain partner culture differences, trust and ethics, information technology deficiency. These problems are at both the enterprise level and supply chain level and hence need to be tackled to improve performance of the supply chain as a whole.

Reviewed supply chain scientific literature provides plausible solutions to supply chain barriers. Some of the plausible solution noted in literature according to Mentzer *et al* (2001) Fawcett *et al* (2008) & Sridharan (2005), include information transparency, collaborative planning, supply chain design and alignment, individual activities management and human factor control. In a commercial setting, these lead to increased revenues, inventory turnover, decreased order time, responsiveness, decreased time to market, reduced distribution costs- supply chain performance.

The chartered institute of purchasing and supply (CIPS 2012) identifies key subcomponents of the supply chain that are key predictors of supply chain performance. These include; procurement, operations, logistics and distribution, the integration of which determine to a great extent the effectiveness of a supply chain. Similarly, Croom *et al* (2000) and Wisner & Tan (2000) agree that all encompassing philosophy of SCM embraces each of the stated subcomponents to produce overall supply chain performance

Procurement Process in the supply chain

Procurement as defined by Hoekman, Ptrois & Mavroids (1997) is the whole process of acquiring property or services. Public procurement, a division of procurement, entails any procurement which is financed by public funds. "Public funds" means monetary resources appropriated to procuring entities through the budgetary process, as well as extra budgetary funds, including aid, grants and credits, put at the disposal of procuring entities by foreign donors, and revenues of procuring entities (PPDA 2005). The Organization for Economic Cooperation and Development (OECD) acknowledges that government worldwide act as providers of essential services for socio-economic development through public procurement such as health, education, agricultural support and infrastructure, especially in developing country where major vulnerable populations exist.

Arrowsmith (1998) in agreement, notes that procurement has been utilized as an important tool for achieving social economic goals. Thai (2001) defines the goals of a procurement system as being divided into two: 1; procurement goals, to include quality, timeliness, cost and integrity and: 2; non procurement goals to include economic, social and green procurement goals. Both these goals must be achieved to create value to citizenly of any nation. Aketch (2009) identifies two different ways in which procurement is actualized. 1: project specific procurement; is procurement of goods, works, and services sought for a particular initiative and 2: general procurement; which relate to general consumable required by a procuring entity to perform its goals. In this context, procurement of subsidized fertilizer is project specific procurement.

OECD (2009) defines the overriding goal of any state public procurement system is to deliver efficiency and value for money in use of public funds whilst adhering to regulation and policy. In this regard, Ogola(2008) & Otieno (2004) estimate the cost of inefficiency of public procurement in Kenya at ksh 30 billion out of poor planning and irregular procurement activities in public institutions leading to misappropriation of resources.

The ability of a government meeting its development objectives, according to word Bank (2004), is hinged on the efficiency in project specific procurement management. Most governments' development agenda is implemented in public projects such as infrastructure, health and education. The successful implementation, and hence achievement of project objectives, is predicted by, among other things, the public procurement process: planning, supplier selection and contract management, that is transparent, open and accountable to ensure funds are absorbed into the project as outlined (Thai, 2001). The subsidy program is a project aimed at stimulating agricultural production in the country (Duflo, Esther, Michael, & Jonathan, 2008)

Distribution system in the supply chain

Keskinocak & Tayur (2001) in an analysis of supply chains identifies distribution as a core subsystem within the entire supply chain that defines whether the supply chain objectives will be achieved. Distribution is an element of the marketing mix; others include product, pricing and promotion, that is defined as making products or services available for use by consumers using direct or indirect means.(Kotler, Keller & Burton 2009). Kotler et al (2002) further asserts that distribution takes place by means of channels, which can be classified according to the number of intermediaries between source (producer) and consumer.

A level zero channel has no intermediary. Burton (2008) identifies three types of distribution in various channels: intensive distribution where products are stocked widely in many outlets, selective distribution where producers rely on few intermediaries and exclusive distribution where producer relies on very few or one intermediary

Chopra, Sunil & Meindl (2001) explains that while customer service consist of many components, response time, product availability and variety, and customer experience are most directly influenced by the structure and capability of the distribution design in a supply chain.

Mbugua (2008) in a study on distribution of petroleum products in Nairobi established that outlet location and number of outlets is vital to ensuring product availability and customer response. Customized packaging is also another key element of the distribution system that has been found to enhance variety and customer experience in studies by Dibb & Smoking (2001) and Mulinge (2006)

Subsidized fertilizer in Kenya is distributed to farmers by the government through a voucher redemption program managed by the national cereals and produce board, which is solely mandated to procure and distribute the subsidized fertilizer country wide (MOA 2012). The distribution system revolves around, according to Gregory (2004), a mechanism of qualifying recipients and distributing vouchers to them; a system for financing the distribution of inputs and moving them through the supply chain of the distributor. Voucher programs bring innovation in design of distribution system that is capable of targeting most constrained farmers.

Ethics in the Supply Chain

Ethics, according to Paul, Richard; Elder, Linda (2006) also known as moral philosophy concerns itself with moral actions. It's a branch of philosophy that involves systematizing, defending, and recommending concepts of right and wrong conduct. It is a complement to aesthetics in Axiology, a field of philosophy. Ethics in simple definition studies moral behavior in human beings and how one should act and is divided into: Meta-ethics, about the theoretical meaning and reference of moral propositions and how their truth values may be determined; Normative ethics, about practical means of determining a moral cause of action; Applied Ethics, about how outcomes can be achieved in specific situations; Descriptive Ethics, also known as comparative ethics, is about people's belief about morality.

Ethics seems to revolve around the concept of human Morality- concepts such as good and evil, right or wrong, virtue or vice, and justice and crime (Hoy, D. 2005). Notably, despite all technological advances, supply chains are always based on the interaction of people. And wherever people interact, a kaleidoscope of ethical issues emerge (.Bobo& Magdalena 2007). Ethics is the basis on which most of the supply chain related principles, such as fairness, integrity, and transparency, are based. Professional standards of ethical conduct, no matter what the organization, contain typical characteristics, including commitments to: Behave honorably in all aspects of work and professional activity; Conduct oneself in such a manner as to maintain trust and confidence in the integrity of the acquisition process; Avoid "clever" practices intended to take undue advantage of others or the system; Uphold the organization's standards and policies and all relevant legislation; Avoid conflicts of interest. (Locke & Romis, 2007).

Information Technology in the Supply Chain

In the realms of supply chain management, use of IT refers to the use of inter organizational systems that are used for information sharing or processing across organizational boundaries

(Subramani, 2004). According Subramani (2004), besides internal IT systems such as ERPS, includes all other information systems such as distribution resource planning, capacity planning systems as well as other tools such as RFID, barcodes, and EDI platforms that are used in supply chain transactions to enhance processing and communication. Supply chain management emphasizes on long term benefit of all parties on the chain through cooperation and information sharing. This affirms the importance IT in the supply chain (Jiang & Jiang, 2007).

Research demonstrates that Information technology use in managing purchasing in the supply chain is widely utilized in a variety of procurement applications including communication with vendors, checking vendor price quotes, international sourcing over internet and negotiations (Tippins, 2003). Information technology increases information processing capabilities of suppliers, thereby enabling or supporting greater relationship in addition to reducing uncertainty (Yu, Z. et al, 2001). As such, it leads to reduced cycle time, cost of procurement and errors in the processing orders.

Information technology has been applied to logistics and distribution: for example tracking systems in transportation, and distribution planning systems. This creates better visibility of the distribution channel as well as allows better control of the logistics systems (Zhu, 2006). Additionally, it tools such as RFID, barcodes, and EDI platforms have enabled firms be more proactive in the management of inventory in the supply chain.

Ultimately, IT can lower coordination costs, and in supply chain context, can substantially improve transactional efficiencies through increased information sharing and communications capabilities, resulting in improved supply chain performance (Jiang & Jiang, 2007).

Research Methodology

Research design

Research design, according to Babbie (2002) is the arrangement of conditions for data collection and analysis in a way that aims to combine relevance to the research purpose with economy in the procedure. This study adopted a descriptive research design. Descriptive survey research seeks to obtain information that describes existing phenomena. In so doing, it seeks individuals' exact perceptions; attitude, behavior or values to determine and report the way things are to enable description of characteristics associated with target population, estimates of proportions of a population that have these characteristics and discovery of associations among different variables. Descriptive research portrays an accurate profile of persons, events, or situations (Robson, 2002) in their current state. Inferential statistics were used to map the relationship between variables in the study. These two approaches are vital to enable an understanding of the factors affecting the supply chain of subsidized fertilizer in Kenya

Population

Population is the entire group of individuals or items under consideration in any field of inquiry and has a common attribute (Mugenda & Mugenda, 2003). This study collected data on procurement, distribution and ethical issues of subsidized fertilizer supply chain. Accordingly, the target population was the procurement and logistics departments staff at the national cereals and produce board (NCPB) six regional offices; the firm that is responsible for the acquisition and distribution of subsidized fertilizer.

Sampling and Sample size

This study sought data from the national cereals and produce board pertaining to the supply chain of subsidized fertilizer in Kenya. The study sought data from correspondents in each of the six regional offices of the national cereals and produce board. Purposive sampling approach was used to inform data collection from only the relevant functions. The study sought data from two main functions: Procurement and Distribution/logistics. The sample size, obtained from Andrew Fisher's Method, (1994) was 60. The formula was successfully used in a baseline survey conducted by the ministry of health on the risk factors influencing children's healthy environment: A case of Kaplamai division in Trans-Nzoia district. Kenya. The formula is given:

$$n = \frac{Z^2 PQ}{m^2}$$

Where, P = likely value of the parameter, m = Permissible margin of error, Z = value of standard normal deviate corresponding to a level of significance, n = desired sample size, Q = 1-P
P = 0.04, m = 0.05, Z = 1.96 at 95% confidence level, n = 59.6 = 60

Data collection

This study used primary data for statistical analysis. According to Kothari (2004) Primary data is data which is collected afresh and for the first time, and thus happens to be original in character. Semi structured questionnaires will be used. Questionnaires were used to obtain important information about the population. The questionnaire was developed to address each specific objective, research question or hypothesis of the study (Mugenda & Mugenda 2003). The data was collected through drop and pick method of administering questionnaires.

Data analysis and presentation

To enable the researcher understand the data collected and assign meaning to the resulting statistics, an analysis of data was done to summarize the essential features and relationships of data in order to generalize and determine patterns of behavior and particular outcomes. The completed questionnaires were edited for completeness and consistency before responses could be processed. Qualitative and quantitative techniques were used in the data analysis.

Content analysis was done, while descriptive analysis such as mean and percentages were used to analyze the data. Inferential statistics, regression, was used. Data was organized and interpreted on account of concurrence to objectives using assistance of the computer package, statistical package for social scientists (SPSS) version 18, to communicate research findings.

ANOVA was used to test the level of significance of the variables on the dependent variable at 95% level of significance. Tables were used for data presentation. After analysis and interpretation of data, a final report is presented summarizing the findings and conclusions as well as the research recommendations.

The study used the following regression model. $Y = a + X_1 \text{PROC} + X_2 \text{DIST} + X_3 \text{ETH} + X_4 \text{IT} + e$

Where Y= effectiveness of the supply chain of subsidized fertilizer, a=constant, $X_{i's}$ = coefficient of variables of the study, PROC- procurement Process, DIST- Distribution system, ETH- Ethics, IT- Information Technology. e=represents the error term.

$$\text{PROC} = [Y - a - X_2 \text{DIST} - X_3 \text{ETH} - X_4 \text{IT} - e] / X_1$$

$$\text{DIST} = [Y - a - X_1 \text{PROC} - X_3 \text{ETH} - X_4 \text{IT} - e] / X_2$$

$$\text{ETH} = [Y - a - X_1 \text{PROC} - X_2 \text{DIST} - X_4 \text{IT} - e] / X_3$$

$$\text{IT} = [Y - a - X_1 \text{PROC} - X_2 \text{DIST} - X_3 \text{ETH} - e] / X_4$$

Research Findings and Discussion

Of the 59 respondents, 40.7% were procurement staff while 59.3% were from the distribution department. This is indicative that all respondents were knowledgeable of the supply chain of subsidized fertilizer in Kenya. In terms of age, 10.2% were below 25 years of age, 35.6% were between 25 and 35 years and 36 and 45 years age groups respectively. Further analysis indicated that 29.3% have served in the organization for a period shorter than 5 years, while 39.7% and 12% have served the organization for a period between 6-10 years and 11-15 years respectively. 19% have served for over 15 years. The analysis also established that majority of the respondents (49.2%) were normal staff, while the middle level manager and senior level managers accounted for 35.6% and 15.3% respectively. This points to the fact that most of the respondents were experienced since they had worked long enough to be conversant with the supply of subsidized fertilizer which commenced in the year 2008.

Procurement Process

Procurement process is the whole process of acquiring goods and services. The Organization for Economic Cooperation and Development (OECD 2008) acknowledges that government worldwide act as providers of essential services for socio-economic development through public procurement such as health, education, agricultural support and infrastructure, especially in developing country where major vulnerable populations exist.

The study sought to find the extent of agreement of the respondents on the effects of the procurement process on effectiveness of the supply chain of subsidized fertilizer. The mean, as shown in the table below, was found to be 4.559 showing that the respondents agreed that procurement process affects the effectiveness of the supply chain of subsidized fertilizer to a

very great extent. It was also gathered from the study that respondents agreed to a little extent that timely and proper procurement planning to enable procurement of fertilizer on time, indicated by a mean of 2.0000.

Further, respondents agreed to a little extent that; supplier selection is conducted professionally towards the success of the subsidy program, management of contract with supplier is done to ensure delivery of right subsidy inputs on time and that competency of supply chain staff is sufficient to enable professional management of supply chain activities, which is indicated by a mean of 2.2373, 2.1695 and 2.6102 respectively.

Distribution System

Distribution is defined as making products or services available for use by consumers using direct or indirect means (Kotler, Keller & Burton 2009). Keskinocak & Tayur (2001) in an analysis of supply chains identifies distribution as a core subsystem within the entire supply chain that defines whether the supply chain objectives will be achieved. The study revealed that respondents agree that the distribution system greatly affects the effectiveness of the supply chain of subsidized fertilizer. This is indicated by a mean of 4.1695.

Further analysis of the distribution system subcomponents on the effectiveness of supply chain of subsidized fertilizer, reveals that respondents agreed to a little extent that; distribution channel, transport and logistics capacity is adequate to supply current farmers, targeting activities are well coordinated to ensure only the selected farmers receive fertilizer, and current packaging as opposed to customized packaging size is essential to meet current distribution needs of different farmers, as indicated by a mean of 2.1356, 2.1356, and 2.0339 respectively of the extent of agreement.

Ethical Issues

Despite all technological advances, supply chains are always based on the interaction of people. And wherever people interact, a kaleidoscope of ethical issues emerge (.Bobo& Magdalena 2007). Professional standards of ethical conduct, no matter what the organization, contain typical characteristics, including commitments to: Behave honorably in all aspects of work and professional activity; Conduct oneself in such a manner as to maintain trust and confidence in the integrity of the acquisition process; Avoid “clever” practices intended to take undue advantage of others or the system; Uphold the organization’s standards and policies and all relevant legislation; Avoid conflicts of interest (Locke & Romis 2007). The study established, from the respondents opinions, that ethical issues affect the effectiveness of the supply chain of subsidized fertilizer to a moderate extent as shown by a mean of 3.2881.

Respondents also agreed to a little extent on the following components of ethics that affect the effectiveness of the supply chain of subsidized fertilizer; Organization policy, as well as supply chain policies reduce instances of conflict of interest in the supply of subsidized fertilizer, Level

of Transparency in processes in the supply of subsidized fertilizer is reflected in the effectiveness of the subsidy program, and Political interference in the supply of subsidized fertilizer is minimal. This is indicated by a mean of 2.4237, 2.3220 and 1.9661 respectively.

Information Technology

In the realms of supply chain management, use of IT refers to the use of inter organizational systems that are used for information sharing or processing across organizational boundaries (Subramani, 2004). Information technology has the ability of managing information flow on dimensions of supply chain, Such as cost, quality, flexibility and timely delivery of goods and services and ultimately profit of organization (Droochy & Nick, 2007). On analysis of the data collected, the study revealed that information technology has a moderate effect on the effectiveness of the supply chain of subsidized fertilizer. This is indicated by a mean of 3.3898.

The respondents also agreed to a little extent, shown by a mean of 2.4576, 2.4407 and 2.6441, that; supply chain employees are competent enough to use IT systems and tools in transactions processing to detect anomalies, that the management has implemented scalable communication infrastructure to promote supply chain effectiveness, and that IT systems are being used in transaction processing to enhance transparency and integrity respectively.

Supply Chain Effectiveness

Hertz (2001) states the common objective of any supply chain as efficiency and effectiveness. Efficiency is an internal standard of performance while effectiveness is an external standard of fit to various groups' demands. . Supply chain effectiveness is equalized, by Gunasekaren, Patel and Tirtiro (2001), to the level to which organizations involved in delivering value to customers create customer satisfaction by delivering the right product offering at the right time at the right place. Analysis of respondents' opinions, to the statement; the supply chain of subsidized fertilizer is effective, yielded a mean of 1.8475 showing a little extent of agreement to the statement. Further analysis of the respondents' extent of agreement to statements relating to the effectiveness of the supply chain of subsidized fertilizer yielded a mean of 1.5763, 1.7458 and 2.0000 respectively to the following statements; subsidized fertilizer is delivered on time to farmers to enable application on time; the right quantity of fertilizer is supplied to meet farmers needs; and satisfactory service is offered by the organization to farmers requiring subsidized fertilizer. This shows low extent level of agreement.

Regression Analysis

In addition, the researcher conducted a multiple regression analysis so as to test relationship among variables (independent) on the effectiveness of the supply chain of subsidized fertilizer. The researcher applied the statistical package for social sciences (SPSS) to code, enter and compute the measurements of the multiple regressions for the study.

Table 1: Model Summary

Model	R	R Square	Adjusted R Square	Std Error of the Estimate
1	.725 ^a	.526	.491	1.38573

a. Predictors: (constant), information technology, ethical issues, distribution system, procurement process

Coefficient of determination explains the extent to which changes in the dependent variable can be explained by the change in the independent variables or the percentage of variation in the dependent variable. The four independent variables, Procurement process, distribution system, ethical issues and information technology, that were studied, explain only 52.6% of the effectiveness of the supply chain.

Table 2: ANOVA

Model		Sum of Squares	Df	Mean Of Squares	F	Sig
1	Regression	115.188	4	28.797	14.997	.000a
	Residual	103.693	54	1.920		
	Total	218.881	58			

a. Predictors: (Constant), information_technology, ethical_issues, distribution_system, procurement_process

b. Dependent Variable: effectiveness_supply_chain

The significance value is 0.000 which is less than 0.05 thus the model is statistically significant in predicting how the four factors have influence on the effectiveness of the supply chain. The F critical at 5% level of significance was 2.5429. Since F calculated is greater than the F critical (value = 14.997), this shows that the overall model was significant.

Table 3: Coefficient of Determination

Model	Unstandardized Coefficients		Standardized Coefficients		t	sig
	B	Std Error	Beta			
1(constant)	-5.43	1.459			-3.721	.000
Procurement process	.232	.135	.180		1.725	.090
Distribution system	.458	.144	.328		3.186	.002
Ethical issues	.276	.135	.205		2.038	.046
Information technology	.519	.140	.376		3.697	.001

A multiple regression analysis was done so as to determine the relationship between effectiveness of supply chain supplies and the four variables. As per the SPSS generated table above, the equation ($Y = a + X_1 \text{PROC} + X_2 \text{DIST} + X_3 \text{ETH} + X_4 \text{IT} + e$) becomes:

$$Y = 0.232\text{PROC} + 0.458\text{DIST} + 0.276 \text{ETH} + 0.519 \text{IT} - 5.430;$$

Where Y is the dependent variable (effectiveness of supply chain), PROC is the procurement process, DIST is distribution system variable, ETH is ethical issues and IT is information technology. The possible value of Y when all independent variables are equal to zero is -5.430 showing that supply chain will be not be effective. The data findings analyzed also showed that taking all other independent variables at zero, a unit increase in procurement process will lead to a 0.232 increase in supply chain effectiveness; a unit increase in distribution system will lead to a 0.458 increase in supply chain effectiveness, a unit increase in ethical issues will lead to a 0.276 increase in supply chain effectiveness and a unit increase in information technology will lead to a 0.519 increase in supply chain effectiveness. At 5% level of significance and 95% level of confidence, procurement process had a 0.090 level of significance, distribution system showed a 0.002 level of significant, ethical issues showed a 0.046 level of significant, and information technology showed a 0.001 level of significant hence the most significant factor are distribution system, ethical issues and information technology since their significance are less than 0.05.

Discussion

This study was conducted to achieve the objective of examining the factors that affect the effectiveness of the supply chain of subsidized fertilizer. The effects of the independent variables; procurement process, distribution system, ethics and information technology, on the dependent variable, the effectiveness of the supply chain, was studied. The demographic information revealed that the respondents were informed of subsidized supply chain activities, owing to their experience in the organization and position in the organization studied, and as such the data collected can be deemed credible for the purpose of the study.

The study got response which depicts that the procurement process affects the effect effectiveness of the supply chain of subsidized fertilizer to a great extent. Further analysis of procurement practices in the organization revealed an insufficient level of timely and proper procurement planning as pertains to subsidized fertilizer.

Also revealed was that the level of professionalism in supplier selection and nature of contract management with suppliers of subsidized fertilizer was shown to be inadequate to ensure effectiveness of the supply chain of subsidized fertilizer.

In addition, competency of supply chain staff, as indicated by the study results, is not sufficient to enable professional management of supply chain activities.

The distribution system, as informed by results presented earlier, was found to have a great effect on the effectiveness of the supply chain of subsidized fertilizer. Further study on the subcomponents of the distribution system revealed inadequate distribution channel, transport and logistical capacity needed to supply current farmers' needs. The study also reveals that while

effort has been put in targeting farmers to receive the subsidy, this activity is not well coordinated and that current packaging as opposed to customized packaging may not meet the need of different farmer.

Further the study, establishes that ethical issues have a moderate effect on the effectiveness of the supply chain of subsidized fertilizer. In addition, it's revealed that current organizational and supply chain policies have minimal effect in reducing conflict of interest while political interference in the supply of subsidized fertilizer was established to be considerable. The level of transparency in supply chain processes was also found to be considerably low. On the effect of IT on the effectiveness of the supply chain of subsidized fertilizer, the study observed a moderate effect. The study reveals that most supply chain employees aren't competent enough to use IT systems and tools in transaction processing to detect anomalies. Also, the study indicates that more information technology infrastructure is needed to promote supply chain visibility. The study reveals that IT systems are in use for transaction processing, but the level of use is not sufficient to enhance transparency and integrity.

Finally, the study got responses which highlight that the supply chain of subsidized fertilizer in Kenya is ineffective in terms of delivering the fertilizer on time to enable application by farmers on time, and supplying the right quantity to meet farmers' demands. Satisfactory customer service is not accorded by the organization to farmers requiring subsidized fertilizer.

The regression analysis reveals the study model is significant: this is to say that the procurement process, distribution system, ethical issues and information technology have a considerable effect on the effectiveness of the supply chain of subsidized fertilizer. The analysis further reveals that these variables can only predict 52.6% of the effectiveness of the supply chain of subsidized fertilizer. Study should be conducted on other factors that affect the supply of subsidized fertilizer.

These findings are consistent with those of Ralph(2000) who established that in order to achieve the supply chain validity of outcome (effectiveness; delivering the right product offering on time, to the right groups and at the right place , all barriers to free flow of products from the supplier to user must be removed. These barriers exist in all activities of the supply chain such as procurement and distribution. These findings are further supported by findings of a study by (Hertz 2001) that ineffective supply chains are loosely integrated with poor management of existing interdependencies These interdependencies refer to the management, and coordination, of activities and functions, individually and collectively, involved in acquisition of raw materials to the point final product is delivered to customer.

Conclusions

The study concludes that the procurement process, distribution system affects the effectiveness of the supply chain of subsidized fertilizer to a great extent while ethical issues and information technology affects it to a moderate extent. These variables, as shown by the data analysis, predict up to 52.6% of the effectiveness of the subsidized fertilizer. It can be concluded that while statistically significant, the overall model of study does not predict comprehensively the effectiveness of the supply chain of subsidized fertilizer. This indicates that there are other

factors that affect the effectiveness of the supply chain of subsidized fertilizer that need studying to establish fully, the factors that affect the effectiveness of the supply chain of subsidized fertilizer in Kenya.

The study concludes that improvements in the management of the procurement process, specifically on procurement planning, supplier selection, contract management and supply chain staff competency, can greatly improve the effectiveness of the supply chain of subsidized fertilizer in Kenya. Improvement of the distribution system can greatly improve the effectiveness of the supply chain of subsidized fertilizer. On the distribution system, this study concludes that the distribution channel and logistics capacity of the organization are inadequate to supply current farmers needs. The study further concludes that targeting of farmers is not well coordinated and that there is a need to customize package size.

On ethics, the study concludes that current organization and supply chain policies are inadequate in reducing conflict of interest in the supply of subsidized fertilizer. Political interference in the supply of subsidized fertilizer can be concluded to be a major hindrance to the effectiveness of the supply chain of subsidized fertilizer. The study further concludes that improvement in the area of information technology, particularly supply chain staff competency on IT, and level of usage of IT systems in transaction processing, can have a significant positive impact on the effectiveness of the supply chain of subsidized fertilizer.

These conclusions are consistent with the theories (TOC, TQM and the General Systems Theory) on which this study is based on. These theories purport that improvement of working systems such as the supply chain by continuous improvement of processes and removal of barriers leads to improved achievement of the systems goals.

Recommendations

The study sought to help key players in the supply of subsidized fertilizer realize significance of the interplay between the variables as shown in the findings of the study. Therefore, this study recommends review of the procurement process in the supply chain of subsidized fertilizer to ensure that timely procurement planning is done to ensure timely acquisition. Further, there is need to monitor the process of supplier selection and management of contracts with suppliers to ensure subsidy inputs are delivered on time as well as training of supply chain staff to improve their competency to enable professional management of supply chain activities.

On the distribution system, the study recommends analysis of the current distribution channel and logistics capacity to identify the inadequacy and outline other probable distribution channels the organization can use in the supply of subsidized fertilizer.

Targeting activities which form the basis of the current input subsidy program should also be analyzed further to identify and eliminate areas of poor coordination to ensure that only the needy farmers get the fertilizer subsidy. The study also recommends the need to have a customized packaging system, probably from the fact that farmers needs vary greatly.

The study further recommends that the National Cereals and Produce Board reviews its organizational and supply chain policy and enact policies that reduce instances of conflict of interest in the supply of subsidized fertilizer. Further, there is need to delink the decision making framework of the organization from the political decision making framework of the Nation to minimize political interference in the supply of subsidized fertilizer in Kenya. Additionally, the study highly recommends the improvements on the level of information technology use in information processing and implementation of scalable communication infrastructure, coupled with training and development of supply chain staff IT skills to promote supply chain effectiveness.

This study sought to explore and indicate the significant relationships between the study variables and effectiveness of the supply chain of subsidized fertilizer. To this end, the findings from the study reveal that the study model predicts only 52.6% of the effectiveness of the supply chain of subsidized fertilizer. This study recommends, to scholars and researchers, to undertake further research on other factors that affect the effectiveness of the supply chain of subsidized fertilizer.

References

- Arora, K. C. (2002). *Total Quality Management*. New Delhi: Kataria and Sons.
- Arrowsmith, S. (1998). *National and International perspectives on the Regulation of Public Procurement*. London: Kluwer Law International.
- Babbie, E. (2002). *Survey research methods* (2nd ed.). Belmont: Wodsworth.
- Basu, R. (2001). *New Criteria of Performance: A Transition from Enterprise to Collaborative*. MCB University Press.
- Bates, R. (1981). *Markets and States in Tropical Africa: the Political Basis of Agricultural Policies*. Berkeley: University of California Press.
- Bertalanffy, V. (1974). *Perspectives on General System Theory*. (T. Edgar, Ed.) New York: Oxford University Press.
- Besterfield, D. H. (1999). *Total Quality Management* (2nd edition.). Prentice Hall.
- Bodo, B. S., & Magdalena, O. (2007). Ethical Issues in Global Supply Chains. *Emerging Issues in Management* .
- Bogdan, R. C. (2003). *Qualitative research for education: An introduction to theories and methods* (4th edition.). New York: Pearson.
- Carter, C. R. (2000). Ethical Issues in international buyer-supplier relationships: a dyadic examination. *Journal of Operations Management*, .
- Chopra, S., & Meindl's. (2001). *Suply Chain Management: Strategy, Planning, and Operation*. India: Prentice Hall.

- Christopher, M. (1998). *Logistics & Supply Chain Management: Strategies for Reducing Costs and Improving Services*. London: Pitman Publishing.
- Cooper, D. R., & Schindler, P. S. (2003). *Business Research Methods* (8th ed.). New Delhi: Tata McGraw-hill.
- Croom (1993). Characteristics of Supply Chain Management and the Implications for Purchasing and Logistics Strategy. *International Journal of Logistics Management, Vol 4 No 2 pp13-24*.
- Dorward, A., & Chirwa, E. (2011). The Malawi Agricultural Input Subsidy Programme: 2005/06 to 2009/10. *International Journal of Agricultural Sustainability Vol 9 No 1*, pp. 232-247.
- Droochy, M., & Nick, M. D. (2007). The Study and Application of Information Technology in Supply Chain Management. *Fourth National Conference on E-commerce*. Iran.
- Duflo, E. (2009). *Nudging Farmers to use Fertiliser Theory and Experimental Evidence from Kenya*. NBER.
- Duflo, Esther, Michael, K., & Jonathan, R. (2008). How High are Rates of Return to Fertilizer? Evidence from Field Experiments in Kenya. *American Economic Review Papers Vol 98 No2*, pp. 482-488.
- Dugger, C. W. (2007). *Ending Famine, Simply by Ignoring the Experts*. New York Times.
- Ganeshan, R., & Harrison, T. P. (1995). An Introduction to Supply Chain Management. *Department of Management Sciences and Information Systems*.
- Goldratts, E. M. (2004). *The Goal*. New York: North River Press.
- Gregory, I. (2004). The Role of Input Vouchers in poor Growth. *African Fertiliser Summit*. Abuja.
- Gunasekaran, A., Patel, C., & Tirtiroglu, E. (2001). Performance measure and metrics in a supply chain environment. *International Journal of Operations & Production Management Vol 21 No2*, pp. 71-87.
- Harland, C. M. (1996). Supply chain management: relationships, chains and networks. *British Academy of Management 7(special issue)*, 63-80.
- Heintzman, & Marson. (2006). (Canadian Government Executive) Retrieved from http://www.hrm-agrh.agc.ca/veo-bve/publications/atricle_e.asp.
- Hertz, S. (2001). Dynamics of alliances in highly integrated supply chain networks. *International Journal of Logistics, 4 (2)*, 237-56.
- Hines et al. (2000). Value Stream Management. *International Journal of Logistics Management*.
- Hoy, D. (2005). Critical resistance from poststructuralism to postcritique. *Massachusetts Institute of Technology*.

- Jiang, H., & Jiang, Y. (2007). Information Technology Support System of Supply Chain Management. *11th WSEAS International Conference*. Dallas, Texas.
- Juttner, U., & Baker, S. (2007). Demand chain management-integrating marketing and supply chain management. *Industrial Marketing Management* .
- Kenneth, B., & Henrik, H. (2011). *Evaluation Study Agricultural input subsidies in Sub-Saharan Africa*. Retrieved from Evaluation Department: www.evaluation.dk
- Kerlinger, F. N. (1986). *Foundations of Behavioral Research, (3rd edition)*, . New York:Harcourt Brace Jovanovich College Publishers.
- Keskinocak, P., & Tayur, S. (2001). Quantitative analysis for internet-enabled supply chains. *Interfaces* , Vol 31 No2,pp. 70-89.
- Kothari, C. R. (2004). *Research Methodology: Methods and Techniques* (2nd ed.). New Delhi, India: New Age International Publishers.
- Kotler, Keller, & Burton. (2009). *Marketing Management*. Frenchs Forest: Pearson Education Australia.
- Lalwani (2006). On Assessing The Sensitivity To Uncertainty In Distribution Network Design. *International Journal of Physical Distribution & Logistics Management, Vol 36 No1*, 68-79.
- Lee, H. L., & Corey, B. (1995). The Evolution of Supply-Chain-Management Models and Practice at Hewlett-Packard. *Interfaces* , pp. 42-63.
- Locke, R., & Romis, M. (2007). Improving Work Conditions in Global Supply Chains. *MIT Sloan Management* , 48, 53-62.
- Mentzer (2001). Defining Supply Chain Management. *Journal of Business Logistics* .
- Minde, I., & Jayne, T. S. (2008). *Promoting Fertiliser Use in Africa: Current Issues and Empirical Evidence from Malawi, Zambia, and Kenya*. Nairobi: Egerton University Tegemeo Institute.
- Ministry Of Agriculture. (2012, March). *About us: MOA*. Retrieved 2013, From Ministry of Agriculture website: www.moa.go.ke
- Minot, N., & Todd, B. (2011). Fertiliser Subsidies in Africa: are vouchers the answer. *IFPRI issue brief 60* .
- Moller, K. E., Kristian, & Pekker, T. (2003). Business suppliers' value creation potential: A capability-based analysis. *Industrial Marketing Management*, 32 (2) , 109-18.
- Msimangira, K. (2003). Purchasing and Supply Chain Management Practices in Botswana. *Supply Chain Management: An International Journal* , 7-11.
- Mugenda, O. M., & Mugenda, A. G. (2003). *Research Methods, Quantitative and Qualitative Approaches*. Nairobi: Acts Press.

- Mugerwa, E. (2006). Factors Affecting Supply Chain Performance of Essential Medicine in Eastern Uganda . *Makerere University Business School* .
- NCPB. (2013). *National Cereals and Produce Board*. Retrieved from www.ncpb.co.ke/index.php
- New, S. J., & Payne, P. (1995). Research frameworks in logistics:three models, seven dinners and a survey. *International Journal of Physical Distribution and Logistics Management* 25 , pp.15-22.
- Noreen, Smith, & Mackey. (1995). *The Theory of Constraints and its implications for Management Accounting*. Barrington: Northriver Press.
- Paul, R., & Elder, L. (2006). The Miniature Guide to Understanding the Foundations of Ethical Reasoning. *The Journal of Philosophical Research* .
- Pfeffer, J., & Salancik, G. (2003). *The external control of organizations: a resource dependence perspective*. Stanford, Calif: Stanford Business Books.
- Radjou, N. (2003). U.S. manufacturers' supply chain Mandate. *World Trade Vol 16 No 12*, pp. 42-46.
- Robinson, S. (2002). *Research Methodology*. Washington D.C.: National Academic Press.
- Rudolf, S. (2011). *Systems Theory*. New York: Sage.
- Sanders et al. (2007). A Multidimensional Framework for Understanding Outsourcing Arrangements. *The Journal of Supply Chain Management* ,Vol 43 pp.4.
- Scott, C, & Westbrook, R. (1991). New strategic tools for supply chain Management. *International Journal of Physical Distribution and Logistics* 21 , 22-33.
- Spens, K. M., & Bask, A. B. (2002). Developing a Framework for Supply Chain Management. *The International Journal of Logistics Management*, Vol 13 , pp. 73-88.
- Sridharan et al. (2005). Implementation of supply chain management and its impact on the value of Firms. *Supply Chain Management: An International Journal*, 10 , 313-318.
- Srivastava, S. K., & Srivastava, R. K. (2006). Managing product returns for reverse logistics. *International Journal of Physical Distribution & Logistics Management*, Vol 36 No, pp. 524-546.
- Stanley, L. L., & Wisner, J. D. (2001). Service Quality along the Supply Chain: Implications for Purchasing. *Journal of Operations Management* .
- Subramani, M. R. (2004). How Do Suppliers Benefit from I.T use in Supply Chain Relationships. *MIS Quartely* 28(1) , 50-75.
- Thai, K. V. (2001). Public Procurement Function in Operations. *Journal of Public Procurement* .

- Tiba, Z. (2009). The role of input subsidies: Operational guidelines on implementation. *Policies for Good Economic Management of Food Price Swings in African Countries*. Rome: FAO Trade and Markets Division.
- Tippins, M. J. (2003). IT Competency and Firm Performance: Is Organisational Learning a Missing Link? *Strategic Mngement Journal Vol 24No 8* , pp.745-761.
- Trent, R. (2001). Applying TQM to SCM. *Supply Chain Management Review* , 70-77.
- Triestch. (2005). From the Flawed “Theory of Constraints” to Hierarchically Balancing Criticalities (HBC). *Department of Information Systems and Operations Management* .
- Udoh, A. J., & Umoh, E. (2011). Fertiliser Use and Sustainable Measures for Increased consumption by Peasant Farmers; Food Security Approach in Rural Nigeria. *Journal of SAT Agricultural Research* 9 .
- Wisner, J. D., & Tan, K. C. (2000). Supply Chain Management and Its Impact on Purchasing. *The Journal of Supply Chain Management Vol 36 No4* , pp. 33-42.
- Wood, G. (2002). A partnership model of corporate ethics. *Journal of Business Ethics* ,Vol 6 pp73.
- Yu, Z. et al. (2001). Benefits of Information Sharing with Supply Chain Partnerships. *Journal of Physical Distribution and Logistics Management* ,pp. 114-119.
- Zhu, K. (2006). Information transparency of business-to-business electronic markets: A game-theoretic analysis. *Management Science Vol 50 No. 5* ,pp. 670-685.