Journal of International Business, Innovation and Strategic Management
Vol 1 Issue (1), 89-110
ISSN: 2617-1805 (Print)

Effects of Global Procurement on Supply Chain Performance among Medical Supply Agents in Kenya

Kenneth Otieno Akoko

College of Human Resource and Development, Jomo Kenyatta University of Agriculture and Technology

Corresponding Author email: kenakok@hotmail.com

To cite this article:

Akoko, K. (2017). Effects of Global Procurement on Supply Chain Performance among Medical Supply Agents in Kenya. *Journal of International Business, Innovation and Strategic Management*, 1(1), 89-110

Abstract: Medical supply chains in Kenya predominantly relies on global procurement of both raw materials and final products, the pharmaceuticals and non-pharmaceuticals, it has been reported that pharmaceuticals in Kenya accounts for 1.65% of GDP making up 36.64% of the total health expenditure. The study analyzed the effects of global procurement on the performance of medical supply agents in Kenya measuring quality of supplies bearing in mind the rise in counterfeits and substandard pharmaceuticals that has been noted to critically affect the beneficiaries of the medical supply chains. This study employed descriptive research design, the target population of this study consisted of all the 375 employees of Kenya Medical Supplies Authority and The Mission for Essential Drugs and Supplies who are directly involved in medical supply chain. A sample size of 96 was sampled randomly from this population and used in responding to questionnaires. Statistical Package for Social Sciences computer software will be used for analysis. Both descriptive and inferential analysis was conducted. The findings indicated that economic fluctuations and legislations have a negative and non-significant effect with supply chain performance. Supply chain management policies as well as technology had a positive and significant effect on supply chain performance. The study recommends that medical supply agents in Kenya should put in place hedging practices and better financial risk management strategies to counter the negative effect of taxes, inflation, exchange rate, recession and trade embargos which negatively affects supply chain performance. To the policy makers, the study recommends that the government and other policy makers in the Ministry of Health and at KEMSA should consider revising legislations regarding medical drugs especially legislations on taxation, drug registration, medical logistics companies and enrolment as they currently negatively affects supply chain performance among medical supply agents in Kenya. The medical supply agents in Kenya should also consider putting in place and practicing supply chain management policies more especially the policies ranging from procurement policy, handling policy, storage and means of transport as these affects supply chain performance among medical supply agents in Kenya positively. Lastly, the study recommends that medical supply agents should also use technology more in stock quantification, stock Management and forecasting since it affects supply chain performance positively

Keywords: *Economic fluctuations, Legislation, Supply chain management policies, Technology, Supply chain performance*

Introduction

In an effort to increase competition and decrease price, the Global Fund to Fight AIDS, Tuberculosis and Malaria recently began asking some grant recipients to use international competitive bidding processes for certain drug purchases. Unfortunately, for countries like Kenya, this request has caused more harm than good. After awarding the tender for its annual supply of the anti-malarial artemether-lumefantrine to the lowest bidder, Ajanta Pharma, Kenya experienced wide stock-outs in part due to the company's inability to supply the order in full and on time, reports further indicated that procurement policies encourage grant recipients to procure products based largely on price alone has placed less value on quality and reliability of supply. This has led to stock-outs and questionable tenders that may cost malaria control programmes more than is saved through open tenders (Cohen, 2008). In countries like Kenya, where as many as 13 million people contract malaria every year and an estimated 48,000 die (WHO, 2008), the successful procurement and distribution of anti-malarial drugs is a matter of life and death. Given the perennial malaria risk in Kenya, drugs should always be available in all clinics. GFATM has allocated millions of dollars for the procurement of life-saving medicines, and by its own measures has done a reasonably good job ensuring that the drugs reach the right people. But its recent five-year internal evaluation acknowledges insufficient accountability of how developing countries use this money, leading to inefficient, sometimes wasteful spending (CGD, 2009). In addition, inconsistent reporting by grant recipients results in unreliable data, which compounds the problem (GF, 2009).

Statement of the problem

Supply chain management performance has profound implications on any organization's ability to meet its customer's demands, its reputation, and its overall financial success (Ambe, 2006) while SCM inefficiency presents the single biggest opportunity for operational inefficiencies in any organization (Feldman, 2003). There has been a rise in complaints by the public, professionals and other stakeholders about the SCM performance within public institutions (WB, 2011). The opinion of many is that SCM within the public institutions way below the stakeholders' (Doreen, 2014). Many public health service delivery points in Kenya have not once but may times experienced stock outs, leading to needy clients inability to buy medicines expensively and prone to counterfeits that have cost many lives and mismanagement due to increase in low quality or counterfeit medicines in Kenyan market (Kazi, 2012). Kenyan pharmaceutical SMEs continue to face several challenges from illegal trade in pharmaceuticals products. Ngetich (2014) argues that there are incalculable financial costs to the reputation of these pharmaceutical importing SMEs and the public health systems as a result of counterfeits. The SMEs lose revenues and profits, with consequences for their shareholders (as stock values are curtailed), their employees (as jobs are lost), and their customers (on to whom the financial losses will be passed in the form of increased prices); states loose valuable tax revenues, as counterfeit goods move through informal markets where taxes and duties are seldom paid; and both public and private actors have to bear the costs of policing, crime prevention, detection and law enforcement (Opiyo, 2006). Counterfeit drugs are a global public health problem causing death, disability and injury affecting adults and children (Kibwage, 2008).

Additionally, patients may lose confidence in health care professionals including their physician and pharmacist, and potentially modern medicine or the pharmaceutical industry in general (Opiyo, 2006). The extreme difficulty in tracing the manufacturing and distribution channels of counterfeit medicines makes their circulation on markets difficult to stop. Even a single case of a counterfeit medicine is unacceptable since it indicates that the pharmaceutical supply system in which it was detected is vulnerable. Worse, it determines the credibility of national health and enforcement agencies (WHO, 2011).In countries like Kenya, where as many as 13 million people contract malaria every year and an estimated 48,000 die because of stockouts in health institutions and increased counterfeits and substandard pharmaceuticals on Kenyan Market (WHO, 2008).

Objectives of the study

i. To analyze effects of economic fluctuations on supply chain performance among medical supply agents in Kenya.
ii. To establish the effects of legislation on supply chain performance among medical supply agents in Kenya.
iii. To determine the effect of supply chain management policies on supply chain performance among medical supply agents in Kenya.
iv. To find out the effect of technology on supply chain performance among medical supply agents in Kenya.

Literature Review

Queuing Theory

Queuing theory is the mathematical theory of waiting lines, it is concerned with the mathematical modeling and analysis of systems that provide service to random demands (i.e. business decisions providing a service) developed by Agner Krarup Elang 1908, a Danish mathematician, statistician and engineer developed to enhance prediction of queue lengths and waiting time to describe the Copenhagen telephone exchange (Sundarapandian, 2009). Queuing theory is of importance in assessing the effects of global procurement on supply chain performance among medical supply agents in Kenya since it is of importance in inventory management and servicing of orders; first in first out principle that ensures customers are served one at a time and that the customer who has been waiting the longest is served first with keen focus on quality and potency since most pharmaceutical formulations loss potency with time (or even become poisons- when expired) and this is again dependent on how well they are stored (Sundarapandian, 2009). In real life, waiting for service is a common phenomenon, global procurement will include acquisition of supplies from foreign markets and this may further have an effect on the lead time aspect that again is of great importance among medical supply agents since stock outs of pharmaceuticals may result to increased costs of medicines resulting to death of very needy patients who may not be able to access the formulations needed thus the Government of Kenya through Pharmacy and Poisons Board would come with legislations to ensure safety in the supply chain (Sundarapandian, 2009).

Performance Prism Theory

Performance prism theory is a second generation measurement framework designed to assist performance measurement selection, created in 2002 by Neely (2002) is a thinking that seeks to integrate five related perspectives and provide a structure that allows executives to think through the answers to five fundamental questions: Stakeholder Satisfaction; who are our stakeholders and what do they want and need?, Stakeholders Contribution; what do we want and need from our stakeholders?, Strategies; what strategies do we need to put in place to satisfy these sets of wants and needs?, Processes: what processes do we need to put in place to satisfy these sets of wants and needs?, Capability: what capabilities- bundles of people, practices, technology and infrastructure do we need in place to allow us to operate our processes more effectively and efficiently?. Together, the five viewpoints provide a comprehensive and integrated framework for managing organizational performance and, by answering the related questions, organizations can build a structured business performance model (Kennerley & Neely, 2002).

Healthcare units will always need supplies in stock, timely deliveries will be of much importance for their smooth running and it is vital for the suppliers to note that the supplies to such critical units are free from defects and counterfeiting is keenly kept off the medical supply chains since such products have been noted to cause dire effects to patients. Once there is understanding between stakeholders in medical supply chains, cost effective healthcare will be achieved since technology will be used to improve efficiency and reduced cost of operation thus the end user of medical products will be protected from exploitation (Kennerley & Neely, 2002).

Transaction Cost Theory

Coase observes that market prices govern the relation between the firms but within firm decisions are made on basis different from maximizing profits subject to market prices. It is evident that market prices in the global arena is greatly affected by the foreign currency fluctuations and most prominently is the United States Dollar that is the prominent currency in global procurement. In global procurement, contracts come to effect and it is of importance to note the legal implications to internationally bound contract that majorly in medical programmes the World Health Organization (WHO) sets the standards but respective countries localize the Essential Drug List (EDL) together with regulations affecting them for instance importation, distribution and taxation policies (Williamson, 2005). Supply chain management policies in medical supply chains are not only of keen interest because they would enhance effective, and efficient operations but in addition these policies need to be stringent to ensure quality as per the National Drug Regulatory Authority and National Bureau of Standards dictate, time aspect is of importance since medicines and medical equipment have set expiry dates and for large consignment logistics must ensure value for money is achieved and not to receive consignments that had long lead times only to reach designated locations close to their expiry dates. Healthcare is a government function and there is need to enhance cost effectiveness to have the government spend minimally on non-value addition thus need of optimizing technology through the use of Enterprise Resource Planning (ERP) which will efficiently be used in quantification and forecasting is wanting (Gereffi, Humphrey & Sturgeon, 2005).

Supply-Chain Operation Reference Theory

The supply chain operations reference model (SCOR) is a management tool used to address, improve, and communicate supply chain management decisions within a company and with suppliers and customers of a company, SCOR model was developed by supply chain council with the assistance of 70 of the world leading manufacturing companies. It has been described as the most promising model for supply chain strategic decision making, it integrates business concepts of process re-engineering, benchmarking, and measurement into its framework which focuses on five areas of supply chain: plan, source, make, deliver, and return; these areas repeat again and again along the supply chain. The supply chain council says this process span from "the supplier's supplier to the customer's customer" (SCM, 2010). SCOR theory is of importance in medical supply chains since it has been vouched as the most promising model for supply chain strategic decision making and integrates business concepts of process re-engineering, benchmarking and measurement into its framework thus can be used by organization for instance KEMSA, MEDS amongst other medical logistics organization to enhance efficiency in their operations; due to volatile economic fluctuations, legislation, supply chain management organization's policies and technology effect to global procurement, it is evident that performance of the medical supply chains whether in public, non-profit oriented, or profit geared organization will be affected (SCM, 2010).

Conceptual Framework

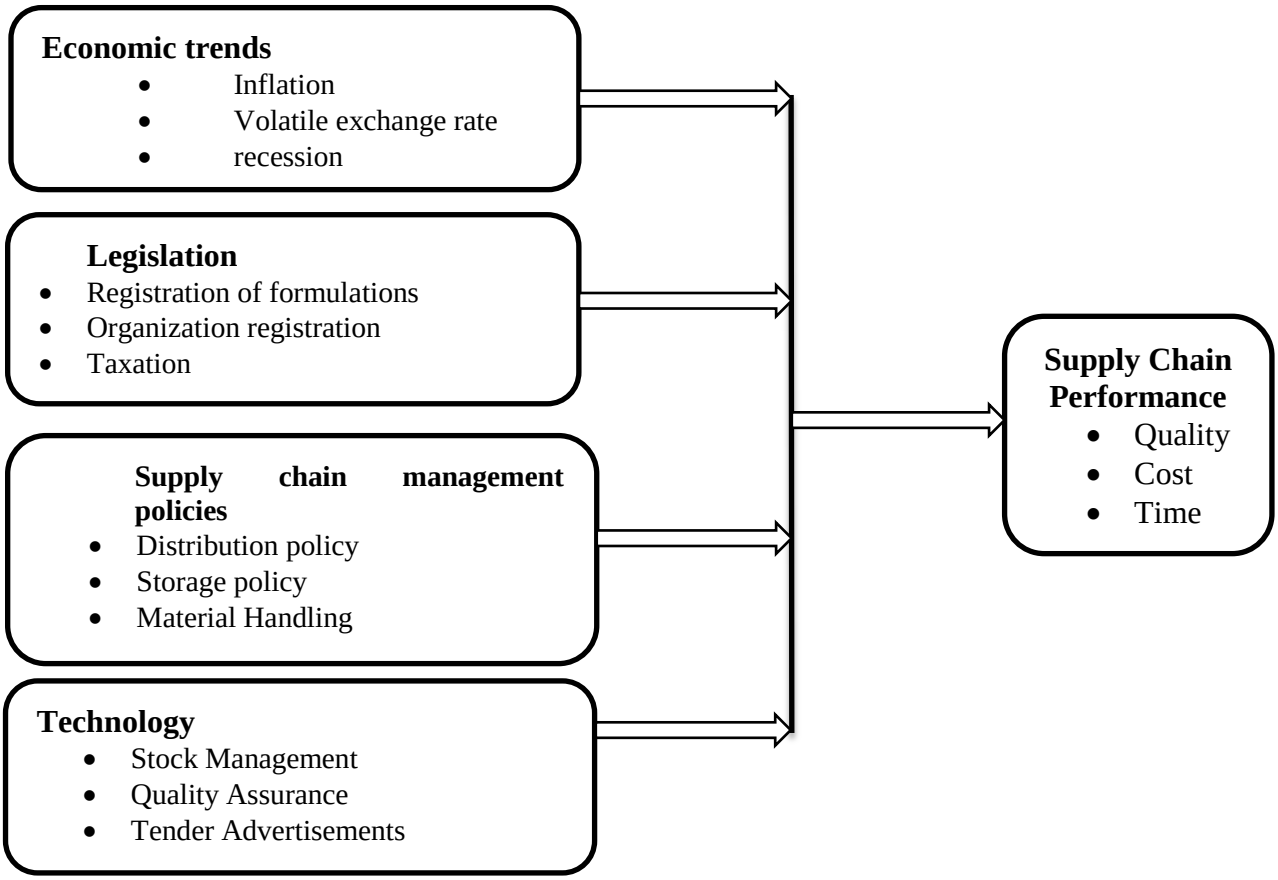

Figure 1: Conceptual Framework

Research Methodology

The study adopted a descriptive research design since it provided data from population on the universe being studied; the researcher has no control over the research, variables (Jankowicz, 2005). The target population of the study consisted of employees of KEMSA and Mission for Essential Drugs and Supplies. According to Prashant (2014) KEMSA has 330 employees whereas Mission for Essential Drugs and Supplies has 104 employees (WHO, 2004). According to Mugenda and Mugenda (2008), at least 10% of the target population is important for the study. In this study, the Cochran's formula was used to determine the sample size (Mugenda & Mugenda, 2003). $n=Z^2 *p*(1-p)/d^2$Where: n= Sample size, Z=Normal distribution Z value score, (1.96)p=Proportion of units in the sample size possessing the variables under study, where for this study it is set at 50% (0.5), d= precision level desired or the significance level which is 0.1 for the study. The substituted values in determining the sample size for a large population are as follows

$$N = \frac{(1.96)^2(0.5)\ (0.5)}{(0.1)^2}$$

$$= 96$$

The sample size for the study was therefore 96 respondents. The sample was drawn from the seven strata. The study used both quantitative and qualitative primary data. The data collection instruments to be used were a

semi-structured questionnaire. Data was analyzed by using SPSS 20.0, descriptive statistics which was presented using mean, correlation, standard deviation and percentages (Millicent, 2015). A multiple regression model was applied to analyze the relationship between the various variables. The relationship equation is shown below-

$Y=\alpha + \beta_1X_1+\beta_2X_2+\beta_3X_3+\beta_4X_4+ \varepsilon$, α = Constant term- the Y intercept

, β= Beta Co-efficient, X_1, X_2, X_3 and X_4= Independent variables, ε = Error term represents the remainder during empirical analysis, Where: Y= SCM performance, X_1=Economic fluctuation, X_2=Legislation, X_3=Supply chain management policies and procedures and X_4=Information technology

Results and Discussions

Response Rate

Table 1: Response Rate

Response	Frequency	Percent
Filled	55	57%
Unfilled	41	43%
Total	**96**	**100%**

The number of questionnaires that were administered was 96. A total of 55 questionnaires were properly filled and returned. This represented an overall successful response rate of 57%. This confirms an argument by Kothari (2004) that a response rate of 50% or more is adequate for a descriptive study. Babbie (2004) also asserted that return rates of 50% are acceptable to analyze and publish, 60% is good and 70% is very good. Based on these assertions from renowned scholars, 57% response rate is adequate for the study. The high response rate was achieved despite the busy schedules of the respondents because the researcher exercised patience during the data collection period. The respondents were given enough time to respond to the questionnaires.

Demographic Characteristics

Respondents working experience

The respondents were asked to indicate period they had worked in their respective organizations. The findings are as presented in Figure 2.

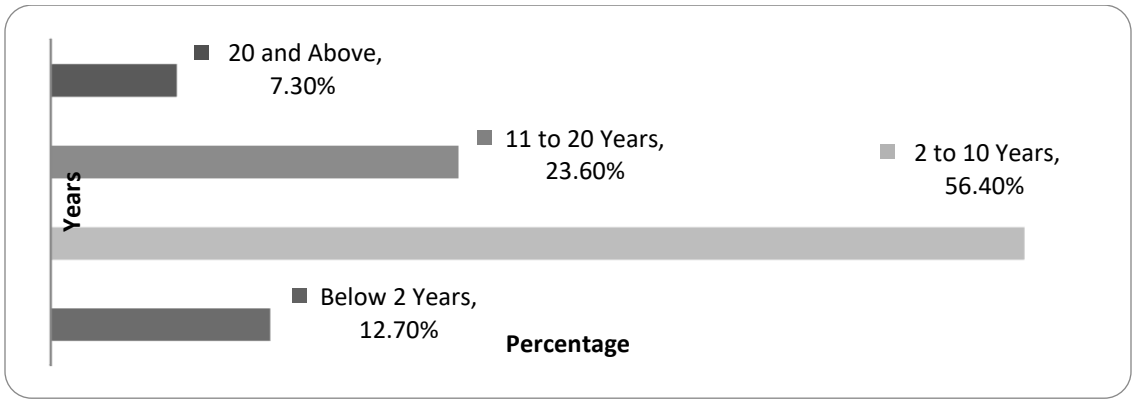

Figure 2: Respondents working experience

The findings indicated that 56% of the respondents had a working experience of between 2 to 10 years while 23% of the respondents had a working experience of between 11 to 20 years. Only 12.7% of the respondents had worked for less than 2 years. The results imply that there is a low turnover rate at KEMSA and Mission for Essential Drugs and Supplies since majority of the respondents had worked in the industry for over 2 years. The high working experience played a role in the high reliability rate since it indicated that the respondents had information of what the study was establishing. This can be linked to an argument by Carpenter *et al*. (2004) that tenure increases, the breadth of knowledge, perspectives, experience, and capabilities that the overall team can bring to bear in a decision situation and because of this, there is reduced turnover rate.

Respondents Level of Education

The respondents were asked to indicate their highest level of education. The findings are as presented in Figure 3.

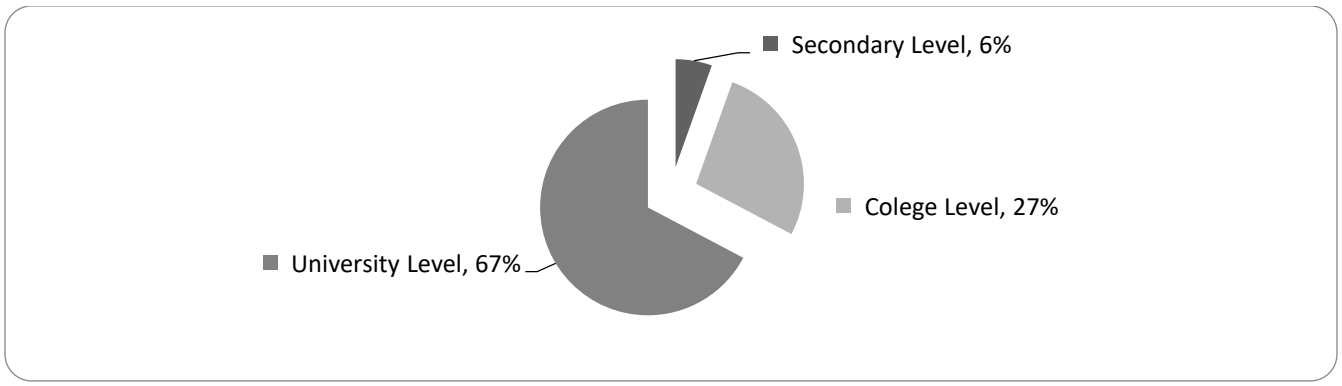

Figure 3: Respondents Level of education

Majority of the respondents, 67%, had university level education, 27% had college level education and only 6% had secondary education. The diversity in the level of education can be explained by the fact that the study involved respondents from all levels that is those in the top management, middle level and employees in non-managerial positions.

The findings nevertheless imply that employees at KEMSA and Mission for Essential Drugs and Supplies are literate. This can also be used to explain the high reliability results since it was assumed that the respondents were able to read and understand the questionnaire well thus contributing to the high reliability rate. These high education level and high reliability rate can be linked to the findings of researchers (Kinuu *et al*, 2012; Kasomi, 2015) who have linked high educational attainment with greater knowledge and skills as well as the findings of a study by Carpenter and Fredrickson (2013) who noted that one of the socio-cognitive capacities related to educational level is greater information-processing abilities.

Respondents Area of Training

The respondents were also asked to indicate their area of training. This was important as it indicated the specialty of the respondents. The findings are as presented in Figure 4.

Figure 4: Area of Training

The findings showed that 47.3% of the respondents were trained in supply chain management while 25.5% were trained in medical practice. Those that indicated being trained in a different field were 27.3% and that included finance, IT, Social Sciences, Secretarial Studies and Entrepreneurship. The findings implied that majority of the respondents had information about supply chain management as it was there are of training. The findings also imply that KEMSA and Mission for Essential Drugs and Supplies place employees to jobs that match their skills.

Economic Fluctuations

The first objective of the study was to examine effects of economic fluctuations on supply chain performance among medical supply agents in Kenya. The descriptive, correlation as well as regression results are presented.Descriptive analysis of Economic Fluctuations**.** The respondents were requested to indicate their agreement or disagreement with whether various economic indicators affect supply chain performance. The statements were on a scale of 1 to 5 where 1 was strongly disagree, 2 was disagree, 3 was neutral,4 was agree and 5 was strongly agree. The results are as presented in Table 2.

Table 2: Descriptive analysis of Economic Fluctuations

Economic Indicator	1	2	3	4	5	Mean	Standard Deviation
Inflation	10.90%	7.30%	5.50%	49.10%	27.30%	3.75	1.25
Recession	5.50%	12.70%	20.00%	54.50%	7.30%	3.45	1.00
Exchange rate	1.80%	9.10%	18.20%	41.80%	29.10%	3.87	1.00
Trade Embargos	1.80%	10.90%	29.10%	49.10%	9.10%	3.53	0.88
Taxes	9.10%	3.60%	3.60%	49.10%	34.50%	3.96	1.17
Average						**3.71**	**1.06**

The findings reveal that 76.4% of the respondents agreed that inflation affects supply chain performance, 61.8% agreed that recession affects, 70.9% agreed that exchange rate affects supply chain performance while 58.2% of the respondents agreed that trade embargos affects supply chain performance. Majority of the respondents, 83.6% indicated that taxes affected supply chain performance. The average mean score of 3.71 indicated that the respondents agreed that all the indicators of economy affects supply chain performance. The standard deviation of 1.06 indicated a small variation in the responses. The study findings imply that economic indicators affect supply chain performance among medical supply agents in Kenya**.** Taxes had the largest effect followed by inflation, exchange rate, recession and lastly trade embargos. The findings of the study are consistent with the findings of a study by PWC (2013) conducted on Global Supply using survey of 500 executives to determine profitability, cost management, and customer satisfaction of firms and a shift in global supply chain realities and found that today's supply chain challenges are linked to market volatility, economic contractions and modest recovery cycles. The respondents were also asked to indicate how often they review exchange rate fluctuations. The results are presented in Figure 5.

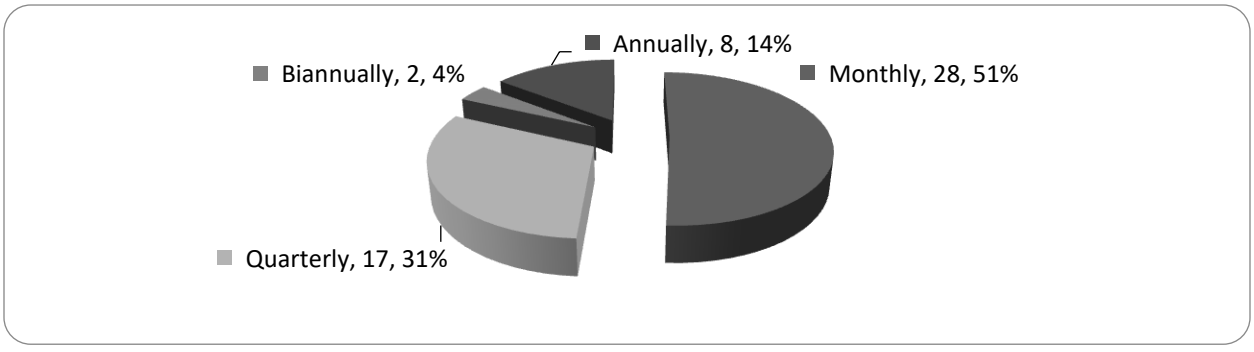

Figure 5: Frequency of Exchange rate Fluctuation Review

The results indicate that majority, 51%, of the respondent's reviews exchange rate fluctuations monthly, 31% reviews quarterly and only 14% reviews annually. The results make sense considering that exchange rate fluctuates from time to time.

The results confirm that this hedging behaviour can be attributed to the earlier descriptive results that exchange rate affects supply chain performance. The findings of the study are consistent with the findings of a study by PWC (2013) and found that executives are very concerned over flexibility due to globalization and its changes on the way companies view and use their supply chains to compete and gain market share.

Correlation of economic fluctuations with supply chain performance

Table 3: Correlation of economic fluctuations with supply chain performance

Correlation		Economic fluctuation	SCM performance
Economic fluctuation	Pearson Correlation	1	
	Sig. (2-tailed)		
SCM performance	Pearson Correlation	-0.136	1
	Sig. (2-tailed)	0.322	

The findings indicated that there is a positive correlation between economic fluctuations and SCM performance. The correlation is however insignificant as indicated by a significance value of 0.322 which is greater than 0.05 when tested at 5% level of significance. The findings imply that economic fluctuations have a negative effect on supply chain performance. The effect is however not noticeable as it is insignificant. This indicates that, no matter the severity of the economic fluctuations, drugs still have to be imported. The study findings are consistent with Chima (2007) who indicated that the implementation of effective supply chain management was found to be significantly affected by changes in the macro-economic environment in the global supply chain.

Effects of economic fluctuations on supply chain performance

Table 4: Effect of economic fluctuations on supply chain performance

Model Summary					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	
1	.136	0.019	0	0.748016	
ANOVA					
	Sum of Squares	df	Mean Square	F	Sig.
Regression	0.559	1	0.559	0.999	.032
Residual	29.655	53	0.56		
Total	30.214	54			
Model Coefficients					
	B	Std. Error	t	Sig.	
(Constant)	3.807	0.548	6.952	0.000	
Economic fluctuation	-0.145	0.145	-1	0.322	

The regression findings indicate that economic fluctuations account for a very small percentage, that is, 1.9%, of the changes in supply chain performance. The model was however significant in explaining the effect of economic fluctuations on supply chain performance as indicated by a significant F statistic. The model coefficients indicated that economic fluctuations are negatively related to supply chain performance.

The effect is however not significant as indicated by an insignificant value of 0.322.These findings imply that economic fluctuations negatively affect supply chain performance. An increase in the fluctuations greatly destabilizes supply chain arrangements hence increasing the supply chain costs. However, this effect is very small to be noticeable since it is not significant. The findings are consistent with the findings of a study by Rong *et al*. (2009) conducted to examine the customer's reaction not only to price itself but changes in the price. The study indicated that price variations under perfect market conditions affect supply chain management performance negatively.

Legislation

Descriptive analysis of Legislation

The respondents were requested to indicate their agreement or disagreement with whether various aspects of legislation affected supply chain performance. The statements were on a scale of 1 to 5 where 1 was strongly disagree, 2 was disagree, 3 was neutral,4 was agree and 5 was strongly agree. The results are as presented in Table 5.

Table 5: Descriptive analysis of Legislation

	1	2	3	4	5	Mean	Std Dev
Drug registration	5.50%	1.80%	3.60%	56.40%	32.70%	4.09	0.97
Registration of medical logistics companies	3.60%	7.30%	14.50%	43.60%	30.90%	3.91	1.04
Enrolment	1.80%	5.50%	23.60%	40.00%	29.10%	3.89	0.96
Pharmaceutical inventory management	3.60%	12.70%	1.80%	56.40%	25.50%	3.87	1.06
Donation of pharmaceuticals	3.60%	9.10%	14.50%	58.20%	14.50%	3.71	0.96
Taxation	7.30%	5.50%	21.80%	43.60%	21.80%	3.67	1.11
Average						**3.86**	**1.01**

The results indicated that 89.1% of the respondents agreed that legislations on drug registration affects supply chain performance, 74.5% agreed that legislations on registration of medical logistics companies affects supply chain performance, 69.1% agreed that legislations on enrolment affects, 89.1% agreed that legislations on pharmaceutical inventory management affects and 72.7% of the respondents agreed that legislations on donation of pharmaceuticals affects supply chain performance. Concerning legislations on taxation, 65.4% agreed that it affects supply chain performance. On average, a mean score of 3.86 indicated that respondents agreed on all the statements of legislations with a small variation in the responses as shown by a variation of 1.01.

These findings imply that legislations on various aspects for instance, taxation, drug registration, medical logistics companies, enrolment as well as pharmaceutical inventory management affects supply chain performance among medical supply agents in Kenya. Features of legislations for instance legal fees or stringent registration procedures have always been considered to be a problem. The results are consistent with the findings of a survey by PPOA (2007) conducted to assess the Procurement System in Kenya and noted that although procedures supporting systematic procurement planning have been established, research showed that these measures were far from always being complied with. Non- compliance led to poor procurement performance.

The respondents were also asked to indicate how frequent Kenya Pharmacy and Poisons Board Inspectors visit the premises for inspection. The results are presented in Figure 6.

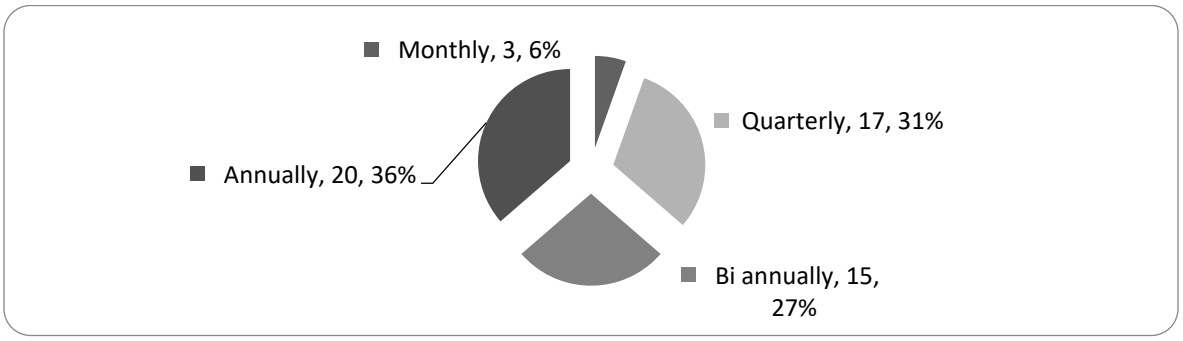

Figure 6: Frequency of KPPB Inspector's visit

The findings indicated that Kenya Pharmacy and Poisons Board Inspectors visit the premises on an annual basis as well as quarterly. No respondent indicated a fail in visit. The rate is however low and a lot needs to be done. Furthermore the respondents were asked to indicate whether they felt that KPPB efficiently fight counterfeiting and illegal distribution and sale of pharmaceuticals. The results are presented in Figure 7.

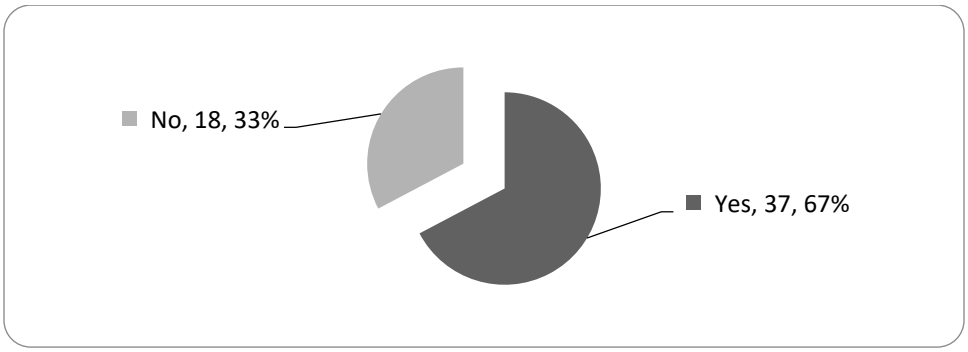

Figure 7: KPPB fight of counterfeit and illegal distribution of pharmaceuticals

Majority of the respondents agreed that KPPB efficiently fight counterfeiting and illegal distribution and sale of pharmaceuticals. Only a small percentage that is 33% of the respondents indicated that KPPB have not efficiently fought counterfeiting and illegal distribution and sale of pharmaceuticals. The results imply that even though majority agreed that there is efficient fight against counterfeiting, the fraction who indicated that the fight is not efficient cannot be ignored. It indicates that the move has not been done to potential as there is still a variation in the opinion. KPPB should consider putting in mechanisms to improve their fight against counterfeit and illegal distribution and sale of pharmaceuticals.

Correlation of Legislation with supply chain performance

Table 6: Correlation of legislation with supply chain performance

Correlations		**Legislation**	**SCM performance**
Legislation	Pearson Correlation	1	
	Sig. (2-tailed)		
SCM performance	Pearson Correlation	-0.119	1
	Sig. (2-tailed)	0.387	

The findings indicated that there is a negative correlation between legislation and SCM performance. The correlation is however insignificant as indicated by a significance value of 0.387 which is greater than 0.05 when tested at 5% level of significance. The results imply that legislations involving drugs handling and importation negatively affect supply chain performance. An increase in conditionality, stringency and legal fees negatively affects supply chain performance. The effect is however not significant. These findings are consistent with Cohen, Reeh and Neroutsos (2011) who looked at public-sector practices for procurement of reproductive health supplies in developing countries and established that the legal, policy, and regulatory environment; government leadership and transparency should be effective in order to have a positive effect on procurement performance.

Effects of legislation on supply chain performance

To establish the effect of legislation on supply chain performance, the study used an ordinary least square regression model. The regression results indicating the model summary, ANOVA results and model coefficients are presented in Table 7.

Table 7: Effects of legislation on supply chain performance

Model Summary					
R	R Square	Adjusted R Square	Std. Error of the Estimate		
.119a	0.014	-0.004	0.749665		
ANOVA					
	Sum of Squares	df	Mean Square	F	Sig.
Regression	0.428	1	0.428	0.762	.038
Residual	29.786	53	0.562		
Total	30.214	54			
Model Coefficients					
	B	Std. Error	t	Sig.	
(Constant)	4.787	0.516	9.274	0.00	
Legislation	-0.115	0.131	-0.873	0.387	

The regression findings indicate that legislations account for a very small percentage, that is, 1.4%, of the changes in supply chain performance. The model was however significant in explaining the effect of legislations on supply chain performance as indicated by a significant F statistic. The model coefficients indicated that legislations are negatively related to supply chain performance. The effect is however not significant as indicated by an insignificant value of 0.387.These findings imply that legislations negatively affect supply chain performance. An increase in conditionality, stringency and legal fees negatively affects supply chain performance. The effect is however not significant. The results are consistent with Mburu (2012) who indicated that public procurement legislations were found to affect procurement performance negatively especially where there was non-clarity and non-compliance.

Supply Chain Management Policies

Descriptive analysis of Supply Chain Management Policies

The respondents were requested to indicate their agreement or disagreement with whether various aspects of supply chain management policies affected supply chain performance. The statements were on a scale of 1 to 5 where 1 was strongly disagree, 2 was disagree, 3 was neutral,4 was agree and 5 was strongly agree. The results are as presented in Table 4.9.

Table 8: Descriptive analysis of Supply Chain Policies

	1	2	3	4	5	Mean	Std Dev
Centralized procurement policy	0.00%	12.70%	5.50%	50.90%	30.90%	4.00	0.94
Decentralized procurement policy	3.60%	14.50%	12.70%	49.10%	20.00%	3.67	1.07
Automation handling policy	0.00%	3.60%	7.30%	49.10%	40.00%	4.25	0.75
Manual handling policy	0.00%	25.50%	14.50%	41.80%	18.20%	3.53	1.07
Storage Temperature	0.00%	1.80%	20.00%	45.50%	32.70%	4.09	0.78
Storage Humidity	0.00%	3.60%	27.30%	49.10%	20.00%	3.85	0.78
Storage Light	0.00%	1.80%	27.30%	50.90%	20.00%	3.89	0.74
Storage FEFO	0.00%	3.60%	10.90%	43.60%	41.80%	4.24	0.79
Storage FIFO	0.00%	7.30%	10.90%	54.50%	27.30%	4.02	0.83
Owned transport for distribution	9.30%	3.70%	13.00%	51.90%	22.20%	3.74	1.14
Outsourced transport for distribution	0.00%	10.90%	10.90%	43.60%	34.50%	4.02	0.95
Average						**3.94**	**0.89**

The findings indicate that majority of the respondents, 81.8%, 69.1%, 89.1%, 60.0% and 78,2% agreed that centralized procurement policy, decentralized procurement policy, automation handling policy, manual handling policy and storage temperature have an effect on supply chain performance. Furthermore, majority of the respondents, over 50% agreed that storage humidity, storage light, storage FEFO, storage FIFO, owned transport for distribution and outsourced transport for distribution have an effect on supply chain performance.

On average, a mean score of 3.94 indicate that majority of the respondents agreed that supply chain management policies affect supply chain performance. There was a small variation in the responses indicating that majority of the respondents indicated similar argument. The results imply that supply chain management policies involving procurement policy, handling policy, storage and means of transport affects supply chain performance among medical supply agents in Kenya. The findings are consistent with the findings of a study by Svenson (2005) which indicated that poor supply chain management practices affect supply chain performance among oil marketing companies by causing the bullwhip effect. The respondents were also asked to indicate the frequency of conducting a medical supply chain planning. The results are presented in Figure 8.

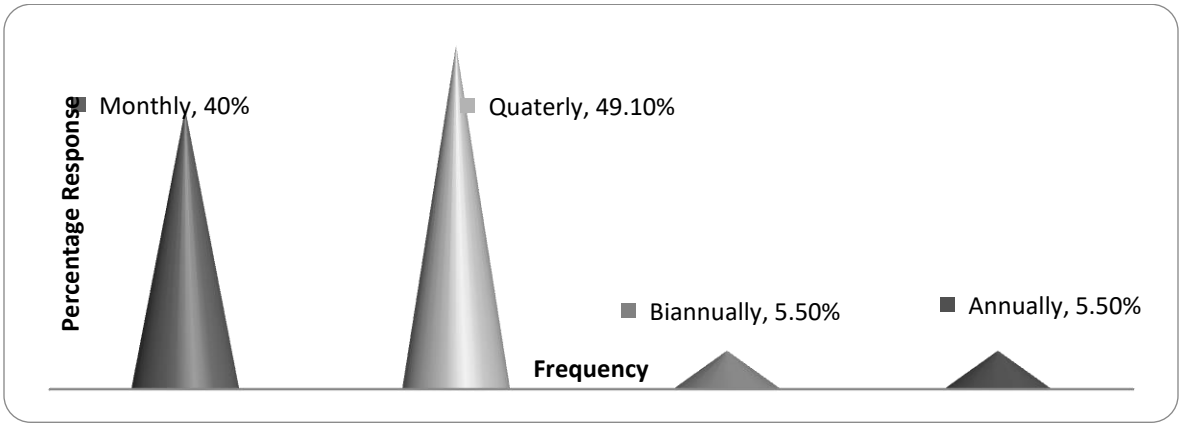

Figure 8: Frequency of conducting a medical supply Chain Planning

The findings indicated that majority of the respondents, 49.1%, indicated that medical supply chain planning were conducted quarterly while 40% of the respondents indicated that it was conducted monthly. These results imply that there is a high rate of conducting medical supply chain planning among medical supply agents in Kenya. This can partly be attributed to the effect of supply chain management policies on supply chain performance. It can also be attributed to the effect of legislations and economic fluctuations on supply chain performance and hence there is a need for frequent medical supply chain planning which can take the tune of monthly or after every three month (quarterly).

Correlation of Supply Chain Management policies with supply chain performance

Table 9: Correlation of SCM Policies with supply chain performance

Correlations		**SCM Policies**	**SCM performance**
SCM Policies	Pearson Correlation	1	
	Sig. (2-tailed)		
SCM performance	Pearson Correlation	0.259	1
	Sig. (2-tailed)	0.046**	

**** Correlation is significant at the 0.05 level (2-tailed).**

The findings indicated that there is a positive correlation between supply chain management policies and SCM performance. The correlation is significant as indicated by a significance value of 0.046 which is less than 0.05 when tested at 5% level of significance. The findings imply that an increase in supply chain management policies for instance procurement policy, handling policy, storage and means of transport will lead to a positive improvement in supply chain performance among medical supply agents in Kenya. This effect is also significant and is expected to be noticeable. Its effect is significant to be felt. This perhaps calls for an increase in these supply chain management policies by the medical supply agents in Kenya. The findings are consistent with the findings of a study by Svenson (2005) which indicated that if the supply chain management policies are effective, it will lead to better supply chain performance thus reducing the reverse bullwhip effect.

Effects of supply chain management policies on supply chain performance

Table 10: Effects of supply chain management policies on supply chain performance

Model Summary					
R	R Square	Adjusted R Square	Std. Error of the Estimate		
.259a	0.067	0.05	0.729213		
ANOVA					
	Sum of Squares	df	Mean Square	F	Sig.
Regression	2.031	1	2.031	3.82	.032
Residual	28.183	53	0.532		
Total	30.214	54			
Coefficients					
	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	t	Sig.	
(Constant)	2.579	0.909	2.838	0.006	
SCM Policies	0.448	0.229	2.955	0.026	

SCM performance = 2.579 + 0.448 (Supply Chain Management Policies)

The regression findings indicate that SSCM policies account for a higher percentage, that is, 6.7%, of the changes in supply chain performance as compared to both legislations and economic fluctuations. The model was also significant in explaining the effect of SCM policies on supply chain performance as indicated by a significant F statistic. The model coefficients indicated that SCM policies are positively and significantly related to supply chain performance. These findings imply that SCM policies positively and significantly affect supply chain performance. There is an indication that better performance of supply chain narrows down to proper supply chain management policies involving procurement policies, storage, handling policy and means of transport. This leads to reduced lead time and costs. The findings agree with Awino (2009) who found out that adopting the right supply chain management strategies for instance operating policies, linkages within supply chain firms, and information technology systems positively affect supply chain performance.

Technology

Descriptive analysis of Technology

The respondents were requested to indicate their agreement or disagreement with whether various aspects of technology affected supply chain performance. The statements were on a scale of 1 to 5 where 1 was strongly disagree, 2 was disagree, 3 was neutral,4 was agree and 5 was strongly agree. The results are as presented in Table 11.

Table 11: Descriptive analysis of Technology

	1	2	3	4	5	Mean	Std Dev
Stock quantification	1.80%	1.80%	12.70%	40.00%	43.60%	4.22	0.88
Stock Management and forecasting	1.80%	1.80%	3.60%	41.80%	50.90%	4.38	0.80
Improves medical supplies chains	1.80%	0.00%	3.60%	41.80%	52.70%	4.44	0.74
Average						**4.35**	**0.74**

The results indicated that majority of the respondents that is 83.6%, 92.7% and 94.5% agreed that the use of technology in stock quantification, stock Management and forecasting respectively affects supply chain performance. The overall mean score of 4.35 also indicates that the respondents agreed with the statements. The responses had a small variation as indicated by a standard variation of 0.74. These results imply that the use of technology in the capacity of stock quantification, stock Management and forecasting affects supply chain performance. This can be attributed to reduced costs. The study can therefore recommend for more use of technology in the activities in order to improve supply chain performance more among medical supply agents. The findings agree with the findings of a study by Jain et al. (2009) conducted to examine supply chain activities at functional and strategic echelons with intrinsic focus on web-enabled collaboration support by information systems among supply chain participants which established that information and communication technology (ICT) has a positive effect on supply chain performance as it facilitates efficient information sharing among supply chain members. The respondents were also asked to indicate whether ICT influenced lead time among medical supply agents in Kenya. The results are presented in Figure 9.

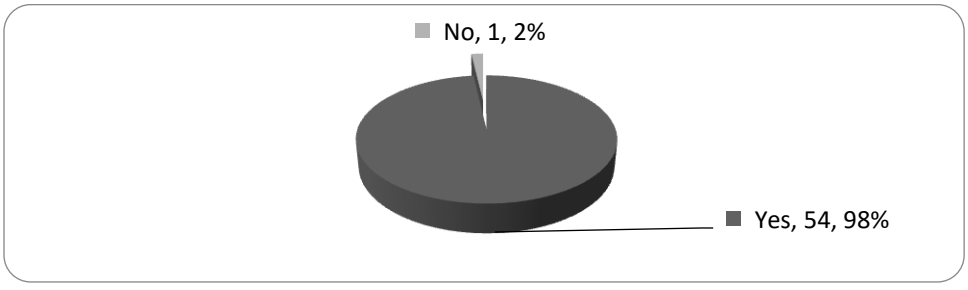

Figure 9: ICT influencing Lead time

The findings indicated that 98% of the respondents supported the argument that ICT influences lead time. This is a confirmation of the findings that the use of technology in the capacity of stock quantification, stock Management and forecasting affects supply chain performance.

Correlation of Technology with supply chain performance

Table 12: Correlation of technology with supply chain performance

Correlations		**Technology**	**SCM performance**
Technology	Pearson Correlation	1	
	Sig. (2-tailed)		
SCM performance	Pearson Correlation	.569**	1
	Sig. (2-tailed)	0.000	

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

The findings indicated that there is a positive correlation between technology and SCM performance. The correlation is significant as indicated by a significance value of 0.000 which is less than 0.05 when tested at 5% level of significance. The findings imply that an increase in the frequency of using technology leads to an improvement in supply chain performance among medical supply agents in Kenya. This effect is also significant and noticeable. This calls for an increase in the use of IT in activities like stock quantification, stock Management and forecasting by the medical supply agents in Kenya. It helps to reduce costs as well as lead time.

Effects of Technology on supply chain performance

To establish the effect of Technology on supply chain performance, the study used an ordinary least square regression model. The regression results indicating the model summary, ANOVA results and model coefficients are presented in Table 13.

Table 13: Effects of Technology on supply chain performance

Model Summary					
R	R Square	Adjusted R Square	Std. Error of the Estimate		
.569	0.324	0.311	0.621005		
ANOVA					
	Sum of Squares	df	Mean Square	F	Sig.
Regression	9.775	1	9.775	25.347	.000
Residual	20.439	53	0.386		
Total	30.214	54			
Coefficients					
	B	Std. Error	t	Sig.	
(Constant)	1.909	0.491	3.888	0.000	
Technology	0.561	0.111	5.035	0.000	

SCM Performance= 1.909 + 0.561 (Technology)

The regression findings indicate that technology account for a highest percentage, that is, 32.4%, of the changes in supply chain performance as compared to legislations, economic fluctuations and SCM policies. The model was also significant in explaining the effect of technology on supply chain performance as indicated by a significant F statistic. The model coefficients indicated that technology is positively and significantly related to supply chain performance. The findings imply that technology positively and significantly affect supply chain performance. An increase in the frequency of using technology leads to a significant improvement in supply chain performance among medical supply agents in Kenya. Technology has the most significant effect on supply chain performance as compared to SCM policies. The results are also consistent with the findings of a study by Abdi (2012) and concluded that the use of ICT in procurement through e - procurement assists the commercial state corporations in reducing costs and improves on supply chain performance through having competitive bidding and sourcing.

Supply chain management performance

The respondents were requested to indicate their agreement or disagreement with statements concerning indicators of supply chain management performance. The statements were on a scale of 1 to 5 where 1 was strongly disagree, 2 was disagree, 3 was neutral,4 was agree and 5 was strongly agree. The results are as presented in Table 14.

Table 14: Descriptive results of Supply chain performance

	1	2	3	4	5	Mean	Std Dev
Cost	1.80%	0.00%	16.40%	36.40%	45.50%	4.24	0.86
Quality	1.80%	0.00%	1.80%	27.30%	69.10%	4.62	0.71
Time / Speed	3.60%	7.30%	7.30%	30.90%	50.90%	4.18	1.09
Average						**4.35**	**0.89**

The results indicate that majority of the respondents, 81.9%, 96.4% and 81.8% agreed that cost, quality and time / speed are the most affected indicators of supply chain performance respectively. The results indicate that among medical supplies agents, the most important indicator of supply chain performance was quality, followed by cost and then lead time.

Conclusion of the Study

The study concluded that economic indicators affect supply chain performance among medical supply agents in Kenya. Taxes have the largest effect followed by inflation, exchange rate, recession and lastly trade embargos.
The study also concluded that economic fluctuations negatively and insignificantly affect supply chain performance. An increase in the fluctuations greatly destabilizes supply chain arrangements hence increasing the supply chain costs. However, this effect is very small to be noticeable since it is not significant. These findings led to the conclusion that legislations on various aspects for instance, taxation, drug registration, medical logistics companies, enrolment as well as pharmaceutical inventory management affects supply chain performance among medical supply agents in Kenya. The study also concluded that legislations involving drugs handling and importation negatively but insignificantly affect supply chain performance. An increase in conditionality, stringency and legal fees negatively affects supply chain performance.

The study concluded that supply chain management policies involving procurement policy, handling policy, storage and means of transport affects supply chain performance among medical supply agents in Kenya. The study also concluded that SCM policies positively and significantly affect supply chain performance. There is an indication that better performance of supply chain narrows down to proper supply chain management policies involving procurement policies, storage, handling policy and means of transport. This leads to reduced lead time and costs. The study findings led to the conclusion that the use of technology in the capacity of stock quantification, stock Management and forecasting affects supply chain performance. The study also concluded that technology positively and significantly affects supply chain performance among medical supply agents in Kenya. This implies that an increase in the frequency of using technology leads to a significant improvement in supply chain performance among medical supply agents in Kenya. Technology has the most significant effect on supply chain performance as compared to SCM policies.

Recommendations

The study recommends that medical supply agents in Kenya should put in place hedging practices and better financial risk management strategies to counter the negative effect of taxes, inflation, exchange rate, recession and trade embargos which negatively affects supply chain performance. To the policy makers, the study recommends that the government and other policy makers in the Ministry of Health and at KEMSA should consider revising legislations regarding medical drugs especially legislations on taxation, drug registration, medical logistics companies and enrolment as they currently negatively affects supply chain performance among medical supply agents in Kenya. The medical supply agents in Kenya should also consider putting in place and practicing supply chain management policies more especially the policies ranging from procurement policy, handling policy, storage and means of transport as these affects supply chain performance among medical supply agents in Kenya positively. Lastly, the study recommends that medical supply agents should also use technology more in stock quantification, stock Management and forecasting since it affects supply chain performance positively.

Conflict of Interest

No potential conflict of interest was reported by the authors.

References

Arnold, U. (1999). Organization of Global Sourcing: Ways towards an Optimal Degree of Centralization. *European Journal of Purchasing & Supply Management*. 7 (6), 45-67

Bahaidar, F. F. (2014). *Factors affecting supply chain management by oil companies in Kenya* (Doctoral dissertation).

Barry, M. (2000). How can performance standards enhance accountability for public health? Journal of Public Health Manahement Practice, Vol. 63, No. 5, 78-84.

Carpenter, M. A., & Fredrickson, J. W. (2013). Top management teams, global strategic posture, and the moderating role of uncertainty. *Academy of Management Journal*, *44*(3): 533-545.

Cooper N & Schinler P. (2000). Research Methodology and Design 5th edition. New York, USA: Macmillan.

Doreen. (2014). Assessment of Factors Affecting Supply Chain Management Performance of Kenyan Public Institutions.

Feldman M, M. S. (2003). An incentive scheme for true information providing in supply chain . Omega; 31, 63-73.

Gereffi, G., Humphrey, J., & Sturgeon, T. (2005). The governance of global value chains. *Review of international political economy*, *12*(1), 78-104.

Jankowicz, A. (2005). Business Research Projects. International Thomson Business Press 4th edition.

Kazi, S. K. (2012). *Supply chain management practices and performance at Kenya Medical Supplies Agency* (Doctoral dissertation, The University of Nairobi).

Kennerley, M., & Neely, A. (2002). Performance measurement frameworks: a review. *Business performance measurement: Theory and practice*, 145-155.

Kibwage, I. O. (2008). Counterfeiting of Drugs and Necessity of Quality Control Systems in Developing Countries. International Journal of Business and Public Management, 1-12.

Kombo, P. (2005). Research Methods 1st edition. Nairobi: ACTS .

Mburu, J. K. (2012). *Factors inhibiting implementation of Public Procurement act (2005) and its regulations in Kenya: A case study of Kajiado North District* (Doctoral dissertation).

McCue & Pitzer. (2000). Centralized vs. Decentralized Purchasing: Current Trends in

Muthoni, D. K. (2016). *Effect of Supply Chain Processes Outsourcing on the Performance of Manufacturing Firms in Kenya* (Doctoral dissertation, JKUAT COHRED).

Ngetich, D. T. (2014). *Outsourcing and supply chain performance of Kenya medical supplies agency* (Doctoral dissertation, University of Nairobi).

Otieno Odek. (2010). Pharmaceutical Products, Protecred Goods and Counterfeit Medicines in Kenya. International Journal of Business and Public Management.

Parikh & Joshi. (2005). Purchasing Process Transformation: Restructuring for Small Purchases. International Journal of Operations & Production Management.

Pharasi B. (2010). Assessment of HIV/AIDS Medical Supplies and Laboratory Commodities Supply Chain in Lesotho.

SCC. (2006). Supply Chain Operations Reference-model (SCOR). Supply Chain Council Vol. 8.

Williamson, O. E. (2005). Transaction cost economics. In *Handbook of new institutional economics* (pp. 41-65). Springer US.

World Trade Organization (2014). Globalization and International Trade: Beyond Economic Growth