SUPPLY CHAIN RISK MANAGEMENT PRACTICES AND SUSTAINABLE PERFORMANCE OF PUBLIC PROCUREMENT IN LAKE REGION ECONOMIC BLOCK, KENYA

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ABSTRACT

The study sought to establish the influence of supply chain quality management practices on sustainable public procurement in Kenya. Descriptive research design was adopted by the study. The Lake Region Economic Bloc (LREB) that covers 11 counties was used as the focus area of the study. County departments, National government departments and agencies were the targets of the study. A total of 290 officers who are in charge of evaluation of bids, contract administration and users were selected for the sample frame. Different departments of County executives, County assemblies, National government departments and agencies with a population of 1,118 officers were targeted. The researcher therefore distributed 290 questionnaires. Out of 290 questionnaires distributed, 278 were completely filled and returned to the researcher, this gave a response rate of 95.9%. This response rate was found to be within the acceptable limits for further analysis and reporting. The study adopted descriptive design where descriptive statistics were developed to facilitate the generation of inferential statistics by use of both univariate and multi-vicariate analysis. The study found that supply chain risk management is statistically significant in explaining sustainable performance of public procurement in LREB, Kenya. The influence was found to be positive. This means that unit improvement in Supply chain risk management practices would lead to an increase in sustainable performance of public procurement in LREB, Kenya. Based on the findings, the study concluded that supply chain risk management practices positively and significantly influences sustainable performance of public procurement in LREB, Kenya. This study therefore recommends that it's crucial for public procurement authorities in Kenya to conduct comprehensive risk assessments within their supply chains. This involves identifying potential risks, such as supply disruptions, environmental concerns, and ethical issues related to suppliers.

Key Words: Supply Chain Risk Management Practices, Sustainable Performance of Public Procurement

Background of the Study

Sustainability and sustainable development have become terms of common usage in public policy around the world. Kuhlman & Farrington (2010) believe sustainability is derived from economic and ecological narratives that define the usage of scarce resources. Kotob (2015) citing Carter & Rogers (2008) looked at sustainability from the economic, social and environmental aspects while incorporating the business aspects of risk management, transparency, strategy and culture. Emas (2015) in reference to Bruntland 1987 report noted that sustainability describe the trade-off between environmental sustainability and economic development. Klarin (2018) citing Sachs (2010) suggests how there is no development without sustainability or sustainability without development. Sustainability therefore is the hallmark of human development.

The Rio ('92) declaration on environment and Development which was anchored on the integration of three components of sustainable development, economic development, social development and environmental protection formed the basis for sustainability approach to development across the world. Pursuant to the ideals of sustainability in development, the nations of the world held a summit dubbed '*The World Summit on Sustainable Developmen*t' in Johannesburg, South Africa in 2002. The summit made a lot of resolutions that form the framework of public governance for the 21st century and beyond. These fundamental resolutions require nations to promote sustainable governance at the domestic level. Thus, sound environmental, social and economic requirements should be anchored in public policy documents. Similarly, it required governance institutions to be responsive to the needs of the people, promote the rule of law, anti-corruption measures, gender equality and an enabling environment for investment that promote sustainable development.

The United Nations 2030 Agenda for Sustainable Development comprising of 17 Goals and 169 targets, sets out an ambitious vision for sustainable development which integrates economic, social and environmental dimensions. In pursuant and operationalization of these ideal, the SDG 12 seeks to achieve sustainable consumption and production by promoting resource and energy efficiency, sustainable infrastructure, and providing access to basic services, green and decent jobs and a better quality of life for all. Notably, under target 12.7, the agenda seeks to promote public procurement practices that are sustainable, in accordance with national policies and priorities. In line with this framework, the EU (2020) policy document on Sustainable Development Strategy calls for the integration of economic, social and environmental considerations into operational procedures to achieve coherence and mutual reinforceability.

The world's annual public procurement spend is about $13 trillion, equivalent to one-sixth of global GDP (Chatham House, 2020). This has the potential to exert huge impact on global economy especially in promoting sustainable development. Nordic report (2021) noted that integration of sustainability aspects in national expenditure frameworks enhance the success of sustainability agenda among the countries of Northern Europe. Thus sustainable procurement of electronic, infrastructure and life style goods should be premised on sustainably responsive supply chain management practices.

As regard the public sector, the Constitution of Kenya (2010) has set the standards for public procurement in Kenya. The constitution in its Article 227 demands that a fair, equitable, transparent, competitive and cost effective system must be in place in procuring entities. It specifies that procurement operations should cater for preference in the allocation of contracts, protection or advancement of persons previously disadvantaged by unfair competition and discrimination.

The Public Procurement and Asset Disposal Act (2015) while borrowing heavily from the United Nations Commission on International Trade Law (UNCITRAL, 2014), operationalized these

standards. Section 41(2-5) of the Act set out the circumstances under which bidders can be debarred to ensure value for money in procurement; Section 53(6)specifically outlines key considerations in procurement planning that take into consideration the need to incorporate Women and Youth under Access to Government Procurement Opportunities (AGPO) policy and Section 60 (3c-g) stipulates key considerations in the design of technical specifications that include life of the item, socio-economic impact of the item, environmental issues, cost of disposal and cost of servicing and maintaining an item. These aspects of technical specifications form the framework for SPP in Kenya. But as Roos, (2013) and Casier et, al (2015) observed, public procurement suffers from a general lack of knowledge on the part of supply chain management officers and the stakeholder groups with regard to policies, requirements and procedures to implement SPP. Consequently, ineffective monitoring schemes to establish the effectiveness of the Preference and Reservations schemes under AGPO policy largely affect implementation of SSP especially in a developing country like Kenya.

Statement of the Problem

Sustainable Public Procurement (SPP) is about governments using their purchasing power to provide leadership for sustainable development (IISD, 2014). This calls for integration of sustainability aspects in public sector supply chain management practices. In the public sector organizations, supply chain is built around the need for accountability, transparency and value for money (Institute of Economic Affairs, 2020). The need to improve public sector organizational efficiency, reduce waste, empower local communities, overcome supply chain risk, and achieve high level of responsiveness to the ever changing public needs, presupposes that sustainability aspects are integrated in supply chain management practices (Montalbán, Pérez, Amalia, Sanz, & Pellice, 2017).SCM practices provide the framework for integrating best practices and effective coordination of sources of supplies and enabling value enhancing relationships that satisfy end customers and other stakeholders (Manokaran, 2019). SCMPs enable organizations to work with the suppliers to bring about holistic value (Gudda & Deya 2019).Sustainability requirements impose a set of infrastructural and system imperatives that must be contextualized in the supply chain management practices.

In the context of Kenya's public sector procurement, sustainability requirements are embedded in procurement legal framework. This includes frameworks for incorporating diversity, development of SMEs through Access to Government Procurement Opportunities (AGPO) and other affirmative programmes in National and County governments' procurement. However, enforcement of affirmative policies by MDAs has always been a challenge. For instance, PPRA report 2020/2021 indicated that Government agencies reserved an average of 18.8% of tenders for the special groups representing an expenditure of Ksh.27.9 billion out of Ksh.148 billion spent on goods, works and services in the FY 2020/2021. This is contrary to the requirement of 30%. This in addition to AGPO groups having capacity challenges in delivering project assignments thus affecting value of goods and project reserved for them. Further, cost escalation is a major problem in public sector supply chain (Institute of Economic Affairs, 2019). For instance, OAG report of 2016/2017 FY documented that Ksh. 2.5 billion of taxpayers' money was paid out for uncompleted works in state departments and Judiciary. This trend continued in the preceding FYs; 2017/2018, 2018/2019, 2020/2021 and 2021/2022 respectively as indicated by incomplete projects occasioned by cost overruns. These challenges have been attributed to ineffective supply chain management practices which failed to integrate sustainability aspects.

Enforcing environmental standards and regulations is one area the government has had challenges especially the ability to monitor the negative impacts of MDAs activities arising from procurement (Muigua, 2019). Transparency international (2020) observed that the local communities should

consistently engage their local administration and NEMA to ensure that their comments inform the environmental review and decision making process in selection and engagement of contractors. Evidence from the ground especially on ongoing public projects indicate suppliers and contractors performing inconsistently from these requirements due to ineffective integration of sustainability aspects in SCMPs.

Many studies have been conducted on the concept of supply chain quality management practices. However, these studies mainly focused on how supply chain quality management practices influence organizational performance. For instance, Apopa (2018) conducted a study to establish effect of supply chain quality management practices on performance in Government ministries with product quality, service delivery, and compliance with statutory obligation and cost efficiency as performance metrics. The perspective was narrow, for it excluded sustainability metrics of performance. Gudda & Deya (2019) though focusing on supply chain quality management practices and how they affect growth in SMEs, focused on private businesses where PPADA, 2015 and regulations 2020 do not apply. Other studies conducted in other countries seem to have follow the same pattern though with different supply chain quality management practices (Manokaran, 2019, Malaysia; Kumar & Kushwaha, 2018, India). Therefore there exist a gap that this study intends to fill. This study therefore sought to establish the influence of supply chain quality management practices on sustainability of public procurement.

General Objective

The general objective of the study was to examine how supply chain risk management practices influence sustainable performance of public procurement in LREB, Kenya.

Theoretical Framework

Resource Based-View Theory

The theory was originated by Penrose E. in 1959. The theory emphasizes the firm's resources as the hallmarks of competitive advantage and performance and postulates that the unique bundles of resources explain the variation in the levels of competitiveness among firms (Maina & Mweru 2016). The theory is based on two assumptions in analyzing sources of competitive advantage; first, the firms within an industry are heterogeneous with respect to the bundle of resources that they control, Secondly, the resource heterogeneity may last over time because the resources that determine firm's competitiveness are not perfectly mobile across firms and hence cannot be traded in factor markets and are difficult to accumulate and imitate (Bridoux, 2015). This Resource uniqueness is a determining factor in competiveness of firms in a supply chain inter-play. Bridoux, (2015) went on to argue that technology can enhance or eliminate the competitive value of resources a firm possess and as such intra-organizational capabilities can thus emerge out of creative destructive nature of technological advancement.
A lot of criticisms have however been levelled against the theory; RBV has no managerial implications (Priem & Butler, 2001); RBV implies infinite regress (Collis, 1994; Priem & Butler, 2001); RBV's applicability is too limited (Gibbert, 2006) and the value of a resource is too indeterminate to provide for useful theory (Lockett et al., 2009; Priem & Butler, 2001). These out of the eight criticisms seek to invalidate the theory in the context of its application in the sharing resources among firms in an inter-dependence relationship. Nonetheless, the theory provides the framework for monitoring and coordination routines between parties in inter-firm relationships as means to integrating resources and capabilities. It also provide mechanism to create value among partners by pooling resources and coordination efforts (Ramon, Florez, & Ramon, 2017).

The Resource-based View (RBV) is a strategic management theory that is widely used in project works, it examines how resources can drive competitive advantage (Almarri & Gardiner, 2014). Sustainable competitive advantage requires enduring benefits through capabilities that are not easily imitated (Almarri & Gardiner, 2014). Capabilities include technological management abilities, operational abilities, innovation abilities and experience with complex project works (Alameri, 2018). RBV has managerial implications in the context of public projects risk management for instance, engineering judgment and mental models are aspects of risk-based decision-making which influence organizational resource management (Govan & Damnjanovic, 2020). Effective management of risk that arise from sharing of resources is critical to ensuring sustainability of works projects. Additionally, the theory is relevant to the study in that in intrinsic unique resources are important in supply chain management integration and are pertinent in generating uniqueness in service delivery.

Conceptual Framework

Adom, Hussein &Agyem, (2018) quoting Camp, (2001) define a conceptual framework as a structure which the researcher believes can best explain the natural progression of the phenomenon to be studied. It is arranged in a logical structure to provide a picture or visual display of how ideas in a study relate to one another (Grant &Osanloo, 2015). It creates linkages with theories, concepts and empirical research in postulating a researcher's view of what kind of relationships the study needs to pursue. It also demonstrates the various actions the researcher needs to pursue with respect to each variable (Adom, Hussein & Agyem, 2018). Figure 2.1 illustrates the conceptual framework that was pursued by this study.
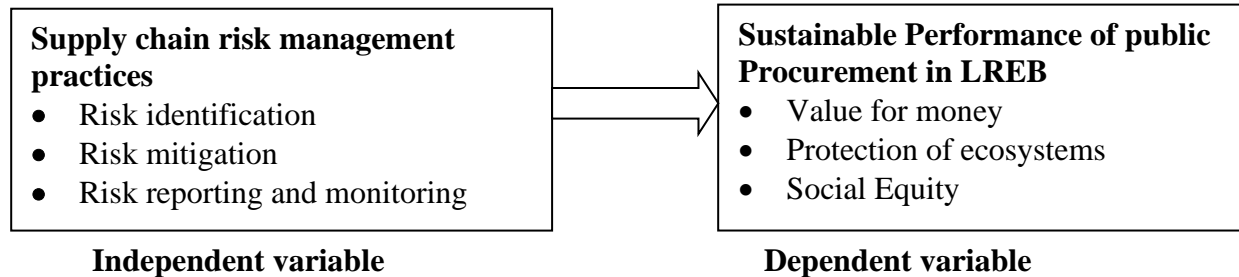
Supply chain risk management practices • Risk identification • Risk mitigation • Risk reporting and monitoring	→	**Sustainable Performance of public Procurement in LREB** • Value for money • Protection of ecosystems • Social Equity
Independent variable		**Dependent variable**

Figure 2. 1: Conceptual framework

Supply Chain Risk Management Practices

Supply chain risk management has been variously defined as the identification and management of risks within the supply chain and risks external to a coordinated approach amongst supply chain members to reduce supply chain vulnerability as a whole (Cranfield University, 2002). Thus, Supply Chain Risk Management (SCRM) is about managing risks that can fundamentally affect the performance of supply chains as a whole. Effective management of risks has become the issue of concern in survival of organizations, both public and private in the face of competitive business environment (Singhal, Agarwal & Mittal, 2011). Supply chain risk management (SCRM) as a natural extension of supply chain management is a framework with the prime objective of identifying the potential sources of risks and suggesting suitable action plans to mitigate them. The SCRM framework provides for critical analysis of supply chain tasks and requires skills and expertise in multiple areas (Singhal, Agarwal & Mittal, 2011).

PricewaterhouseCoopers (2013) in a global study of 209 companies with global foot print identified the following aspects that pose the greatest supply chain risk: raw material prices

fluctuation; currency fluctuations; market changes; fuel prices volatility; environmental catastrophes; raw material scarcity; rising labour costs; geopolitical instability; supplier bankruptcy and changes in technology among other factors greatly affect the performance of the companies and affected their sustainability. Omondi (2014) in a study on Supply Chain Risk Management Practices that affect power supply in Kenya identified fire outbreak, IT system breakdown, loss of key staff and reputational damages as supply chain aspects that disrupt electric power supply in Kenya. Singhal, Agarwal & Mittal (2011) observed that the key issues of supply risks are found to be related to supply system design that is influenced by; number of suppliers (single/multiple sourcing)), location of suppliers (local/global sourcing) and supplier's agility, flexibility, delivery reliability and infrastructural strength and information sharing

Researchers in the field of risk management have variously stated that an ideal approach to managing risks needs to follow a formal and structured approach to identifying, quantifying, and reducing risk (Frosdick, 1997; Khan & Burnes, 2007; Steele & Court, 1996; Yates & Stone, 1992). A similar argument is proposed by Manuj &Mentzer (2008) that suggest that identifying risks is the first step in developing a risk management process. Risk identification enumerates all types of risks in the supply chain (Sharma& Bhat, 2012). Risk identification provides an important first step and deals with identifying and creating a list of threats and opportunities that may impact supply chain performance (Marchewka, 2010). However, identifying the risks that may affect supply chain performance is not always a straightforward task. Risks can emerge at different stages of the supply chain. Supply chain by its very nature is made of different players. Therefore, the process and techniques used to identify supply chain risks must include a broad view of the different processes that constitute a supply chain and attempt to understand causes of particular risks and impact among the various processes and activities in the supply chain (Marchewka, 2010).

Risk identification is an integral part in project supply chain (Association for Project Management, 2018). Sharma & Bhat, (2012) argued for the need for a typology that clearly identifies potential sources of risk in supply chain. Rao, Thomas& Goldsby, (2009) argue that business and organisational risks emerge from one or more of the following sources: environmental factors; industry factors; organisational factors; problem-specific factors and decision-maker related factor. These broad sources of risk form the broad context in supply chain risk can be identified, analyzed and managed. However, public sector supply chain face unique risks that emanate from the very nature of public organizations. The risk of corruption in public procurement in particular is well known globally (Organization for Economic Co-operation and Development, 2019). Article 9 of the United Nations Convention against Corruption calls for governments to ensure an appropriate system of public procurement (United Nations Office on Drugs and Crime, 2019). Nonetheless, public procurement contracts remain highly vulnerable to corruption (United Nations Office on Drugs and Crime, 2019). Identifying susceptible contexts in public supply chain is a challenge and hence the building stock of knowledge. However, as Kohler (2011) observed collusive behaviours, bribery, manipulation of tender prices, deficient civil works certified as complete, broken or damaged equipment certified as compliant with specifications, under delivery of services, and inadequate project audit and control systems form the hallmarks of risks in the public sector supply chain.

Public sector supply chain management is therefore not immuned from the risks that bedevil the private organizations. Sharma & Bhat, (2012) noted supplier's quality problem, supply delays, financial failure of suppliers, capacity shortages in supply markets, supplier failure to reduce costs, unethical practices of suppliers and sudden increase in purchase prices among others are risks that

cut across both public and private sectors. Risk identification processes should be documented to create the right databases that inform further action (Tworek, 2010).

Risk monitoring measures should be instituted at different levels of management in an organization. This entails developing risk monitoring systems and procedures (Owuor, Oginda & Obura, 2019). Risk monitoring applies the principles of risk governance to the identification, assessment, management, reporting and of risks in the context of organizations (IRGC, 2017). This system calls for all the important actors in the decision making process to identify how relevant risk information is collected, analyzed, understood and communicated, and how management decisions are made and communicated ((IRGC, 2017). Broadly risk monitoring governance system is the embodiment of the institutional structures and the policy processes that guide decision making framework to regulate, reduce or control risk within an organization (Renn & Klinke, 2013). This implies the devotion of adequate resources in terms of skills and physical assets to ensure effective risk monitoring frameworks. Institutionalisation of risk monitoring through public policies especially with regard to public organizations is the way forward (OECD, 2014). Such public policies should stipulate the requisite procedures in the entire risk management cycle.

In Kenya's public sector supply chain management however, risk management processes center around all aspects of contract management practices. This entails activities right from invitation to bid, evaluation of bids, awarding and implementation of contracts (Kakwezi 2012). Burt, Dobler& Starling (2004) describe contract management activities to include such functions as inspecting or assuring quality, making transportation arrangements, monitoring delivery schedules, expediting, modifying contracts, administering payment provisions and closing defaulted or completed contracts. This scope of contract management activities is aimed at ensuring achievement of quality, timely and value for money in procured goods works and services (Rotich & Akelo, 2013). Burt, Dobler & Starling (2004) identified four ingredients in service contract management; sound statement of works, selection of the right supplier, fair and reasonable price and aggressive management of contracts. This assertion impose upon organizations the need to have the necessary quality frameworks to manage goods, works and services contracts.

Meričková & Nemec (2013) identified the following factors as affecting enforcement of quality standards in contract management especially in the public sector: the degree of competition in bidding for the contract; the quality of evaluation of the contractors; a clear definition of the contracted/outsourced service/contract specification; the quality of contract monitoring; sanctions; the experience of the public body responsible for contracting and the technical knowledge of the contracted service provider. Mutua, Waiganjo & Oteyo (2014) agreed to the above factors but noted that manufacturing enterprises are uniquely configured in their supply chains and hence may face different challenges in the management of outsources contracts. Accordingly fixed-price contracts were deemed beneficial in ensuring project costs were within budget. Predictability in cost structures is an imperative requirement for successful contract management in private sector organizations as opposed to adherence to technical specifications in public sector. Muhwezi & Ahimbisibwe (2015) noted that inter-functional coordination in all aspects of contract implementation is an important success factor.

Empirical Literature Review

Supply Chain Risk Management Practice

There are inherent risks in supply chains that could potentially affect organizations negatively far more than the internal delivery risks. Risks in supply chains includes the risks of suppliers going

out during economic down turns, or having difficulty getting the right materials or staff during economic booms (CIPS, 2009). These supply chain risks should be managed in their contexts by apply effective frameworks. A number of researches exist on theoretical contructs that provide critical review on how such risks should be managed.

Kohlera & Dimancesco (2020) carried a review of risk of corruption vulnerabilities in public pharmaceutical procurement and how anti-corruption, transparency and accountability measures may mitigate against such risks. The study targeted WHO affiliate states, Geneva Switzerland. The study sought to examine manifestations of corruption in the pharmaceutical procurement supply chain and key factors behind them, and identify how to design and implement effective anti-corruption, transparency and accountability mechanisms within the supply chain. The search focused on publications that addressed the issue of pharmaceutical supply chain and governance and corruption issues. The study material included peer-reviewed literature, books, and reports published by international organizations and donor agencies. The study provided empirical insights on the various risks that exist in pharmaceutical supply chain. The study observed that p procurement is highly vulnerable to corruption particularly in the health sector. Furthermore, corruption risk in pharmaceutical supply chain is not limited to any one level of government or type of health system. It is a pervasive problem that affects many nations. However, the study observed that better integration of accountability, transparency and anti-corruption mechanisms in the supply chain is an imperative requirement to reduce the risk of corruption.

Mvubu & Naude (2020) conducted a study on supply chain risk Management strategies with a focus on South African Third-Party Logistics Providers. The study sought to identify the SCRM strategies that South African 3PL providers have in place to mitigate supply chain risks. An exploratory and descriptive method technique was adopted. Structured questionnaire was designed to collect quantitative data. A total of 398 respondents were targeted. However, 215 questionnaires representing 54% response rate were returned. Data was analysed using SPSS24, using descriptive statistics and binomial tests. The study established that SCRM is a crucial element in decision making because of global interactions that have created new risks in SCM activities. Thus, the adoption of SCRM is vital to mitigate supply chain risks among 3PLs operating in South Africa.

In a study on risk identification management strategy on supply chain performance in manufacturing companies in Kenya Mburu, Ngugi& Ogollah (2015) adopted a cross-section survey of descriptive nature. Citing Kombo, 2006; Kothari, 2004, the study posit that cross-sectional app was appropriate because it provides an opportunity for considering different aspects of the problem under study. The study targeted 153 manufacturing companies in Kenya that are members of Kenya association of Manufacturers in Nairobi industrial area. SPSS version 21 was applied to generate descriptive and inferential statistics. The study was able to develop empirical evidence that most organization risk management strategies act as the drivers to any successful organization performance. The study therefore provide evidence that organizational strengths form the core in any risk management framework. Such strengths should deployed be for the achievement of competitive advantage and safeguard against supply chain vulnerabilities.

Owuor, Oginda, & Obura, (2019) undertook a study on effect of supply chain risk management practices on the supply chain performance of public universities in Kenya. The study focused on how supply chain management risk management activities influence performance. Management policy framework and institutional competence were the activities in the study construct. The study adopted a correlation research design on the 55 supply chain personnel from 12 public universities using saturated sampling approach on 84 officers. Structured questionnaire was developed and distributed. The study applied Pearson product moment correlation to assess the relationship

between the variables. The evidence adduced from the analysis indicated that supply chain risk management practices had a positive relationship with the supply chain performance. The evidence generated from the study shows that effective risk management governance is the way to manage risk. Stein and Wiedemann (2018) in an empirical study posit that risk governance is a litmus test that demonstrate whether an organization scrutinizes its business model proactively for all possible risks and proactively put in place mitigation measures. Risk governance system is not so much about compliance rules, but proactive identification of imaginable risk, prevent unofficial, informal, and unauthorized malpractices of corporate behavior (Stein & Wiedemann, 2018).

RESEARCH METHODOLOGY

Research Design

This study adopted descriptive design. Sekaran (2003) observed that descriptive study is undertaken in order to ascertain and be able to describe the characteristics of the variables of interest in a situation. Descriptive studies are conducted in communities to ascertain extent of issues that affect the community (Mugenda, 2011). The goal of descriptive research therefore is to describe characteristics of phenomena that affect particular situation or community (Nassaji, 2016). In such research, the data may be collected qualitatively, but it is often analyzed quantitatively, using descriptive and inferential statistics to determine relationships. This study analyzed the influence of supply chain management practices on SPP.

Research Philosophy

This study is based on positivistic philosophy. Positivistic approaches are founded on a belief that the study of human behaviour should be conducted in the same way as studies conducted in the natural sciences (Collis & Hussey, 2003). Positivistic approaches seek to identify, measure and evaluate any phenomena and to provide rational explanation for it (Neville, 2007).Positivists believe in establishing linkages and relationships between the different variables of the subject and relate them to a particular theory or practice. This philosophy is appropriate in studying the influence of supply chain management practices on SPP.

Target Population

The population that was of concern for the study was drawn from the Fourteen Counties that constitute the Lake Region Economic Bloc (LREB) in Kenya. This was both County and National Government agencies. The target population which constitute a section of the population as stipulated by Mugenda and Mugenda (2003) were officers who are responsible for procurement initiation, specification development, procurement processing, and evaluation of bids, disposal and contract administration. These are officers who were deemed to be knowledgeable in public supply chain management processes. The table below illustrates the target population in the fourteen counties;

Table 3. 1: Target Population

County	County and National Government and Agencies	Target Population	Percentage
Kisumu	National Government and Agencies	51	4.5
	County Executive and Assembly	46	4.1
Bomet	National Government and Agencies	31	2.8
	County Executive and Assembly	46	4.1
Kericho	National Government and Agencies	31	2.8
	County Executive and Assembly	46	4.1
Bungoma	National Government and Agencies	31	2.8
	County Executive and Assembly	46	4.1
Kakamega	National Government and Agencies	51	4.5
	County Executive and Assembly	46	4.1
Nyamira	National Government and Agencies	31	2.8
	County Executive and Assembly	46	4.1
Homa Bay	National Government and Agencies	31	2.8
	County Executive and assembly	46	4.1
Kisii	National Government and Agencies	31	2.8
	County Executive and Assembly	46	4.1
Siaya	National Government and Agencies	31	2.8
	County Executive and Assembly	46	4.1
Trans Nzoia	National Government and Agencies	31	2.8
	County Executive and Assembly	46	4.1
Migori	National Government and Agencies	31	2.8
	County Executive and Assembly	46	4.1
Vihiga	National Government and Agencies	31	2.8
	County Executive and Assembly	46	4.1
Nandi	National Government and Agencies	31	2.8
	County Executive and Assembly	46	4.1
Busia	National Government and Agencies	31	2.8
	County Executive and Assembly	46	4.1
Total		**1,118**	**100**

SOURCE: County National Government, Agencies, County Executive and Assemblies Human resource departments

Sample Size and Sampling Technique

Sample Size

A sample is a set of observations drawn from a population by a defined procedure (Namusonge, 2018). According to Kasomo (2007, a sample size depends on the purpose of inquiry, number of variable in the study, type of research design, the method of data analysis and size of accessible population. Sample size is governed by the extent of precision and confidence desired (Sekaran, 2003). The confidence level chosen for this study was 95% and hence 5% margin of error. The population for this study is finite and hence the study adopted the formulae by Kothari (2004).

$$n = \frac{z^2 \cdot N \cdot \sigma_p^2}{(N-1)e^2 + z^2 \sigma_p^2}$$

Where; n = Size of the sample,

N = Size of the population and given as 1118
e = Acceptable error and given as 0.05,

∂p = The standard deviation of the population and given as 0.5 where not known,
Z = Standard variation at a confidence level given as 1.96 at 95% confidence level.
Substituting;

Therefore; $n = \dfrac{1.96^2 \cdot 1{,}118 \cdot 0.5*0.5}{(1{,}118-1)0.05^2 + 1.96^2\ 0.5*0.5}$

$n = \dfrac{1073.7272}{2.7925 + 0.9604}$, $\qquad n = \dfrac{1073.7272}{3.7529}$

Therefore; n = 290

Sampling Technique

The study used stratified random sampling to select 290 staff from the target population of 1,118. Kothari & Gaurav (2014) stated that this technique is appropriate if the target population does not constitute a homogenous group.   Proportionate allocation was applied to identify the number of elements allocated to the various strata.

Data Collection Instruments

This study used both primary and secondary data. Primary data was from first-hand occurrence which has not been exposed to processing or any other handling. The primary data was collected by means of questionnaire and an interview schedule. A questionnaire was the main means of collecting quantitative primary data. However, the open ended question items generated qualitative data for the study. Martins, da Cunha & Serra (2018) observed that secondary data includes data that has been gathered before and can be reused for new research to generate new knowledge. Analysis based on secondary therefore provides many opportunities for further research through replication, re-analysis and re-interpretation of existing research (Johnson, 2014. For the purpose of this study, secondary data was collected from published journals and theses.

Pilot Study

Piloting of the questionnaire was carried out to establish the reliability and validity of the instrument. The pilot study was therefore intended to establish the feasibility of the study in terms of the adopted research design, adequacy of the questions and the sample frame. The questionnaire was pre-tested on selected heads of department and sections before commencement of the study. Saunders et al (2016) and Fink (2013) observed that the minimum number of respondents for pilot study is at least 10. This study identified 20 respondents for the pilot as per the recommendations.

Data Analysis and Presentation

The collected data was processed and analyzed as per the study objectives. Both descriptive and inferential statistics were applied. Descriptive statistics such as mean, median, mode and standard deviation were generated. This was to facilitate other analysis in the development of inferential statistics. The hypotheses were tested using F- tests; based on analysis of variance (ANOVA) and t-test was carried to assess the significance of the relationships between variables. Statistical Package for Social Sciences (SPSS) version 24.0 was the tool of analysis. The collected data was assumed to be normally distributed.

Univariate regression model was used to test the relationship between variables. A univariate model has one dependent and one predictor, whereas a multivariate linear regression model has one outcome and multiple predictors (Apopa, 2018). The regression analysis generated other test statistics like Student t-Tests, adjusted R^2 and F-test.

Regression model for objective one;
Supply chain risk management practices
$$Y = \beta_0 + \beta_1 X_1 + \mathcal{E} \;\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.. \;(1)$$
Where;
Y = Sustainable performance of public procurement
β_0 = constant
β_1 = Regression coefficient for
X_1 = Supply chain risk management practices
ε = Random or Stochastic error term

RESEARCH FINDINGS AND DISCUSSION

Descriptive Analysis

This section presents findings on Likert scale questions where respondents were asked to indicate their level of agreement on various statements that relate with the influence of supply chain management practices on sustainable public procurement and the moderating effect of legal requirements. They used a 5-point Likert scale where 1-strongly disagree, 2-disagree, 3-moderate, 4-agree, 5-strongly agree. The means and standard deviations were used to interpret the findings where a mean value of 1-1.4 was strongly disagree, 1.5-2.4 disagree, 2.5-3.4 neutral, 3.5-4.4 agree and 4.5-5 strongly agree. Standard deviation greater than 2 was considered large meaning responses were widely spread out and not tightly clustered around the mean.

Supply Chain Risk Management Practices

The specific objective of the study was to assess the influence of supply chain risk management practices on sustainable public procurement performance. The respondents were requested to indicate their level of agreement on various statements relating to supply chain risk management practices and sustainable public procurement performance. The results were as shown in Table 4.1.

In relation to risk identification practices, the respondents agreed that suppliers are required to share cost escalation with their organization (M= 3.954, SD= 0.365). In addition, the respondents agreed that risks register is maintained with respect to ongoing projects (M= 3.941, SD= 0.406). Further, the respondents agreed that environmental risks are always identified and shared with NEMA (M= 3.926, SD= 0.421). The findings also show that there are mechanisms of identifying collusion among pre-qualified suppliers (M= 3.914, SD= 0.407). The respondents agreed that the organization has procedures for identifying and documenting supply chain risks and allocating responsibilities on managing the same (M= 3.875, SD= 0.429). In addition, ongoing works require convening of forums to identifying potential conflicts with local communities (M= 3.856, SD= 0.391).

Concerning risk monitoring practice, the respondents agreed that supply chain and user departments monitor performance of contractors to ensure performance as per cost obligations (M= 3.923, SD= 0.564). The respondents also agreed that supply chain and user departments ensure adequate framework to monitor project costs, quality and time performance (M= 3.911, SD= 0.365). The respondents agreed that environmental risks emanating from procured/works projects are continuously monitored to ensure effective compliance (M= 3.897, SD= 0.342). In addition, the respondents agreed that engagement frameworks with citizen contractors, AGPO and other disadvantaged groups are reviewed and monitored against set performance standards (M= 3.865, SD= 0.365). Further, the respondents agreed that the organization holds community

stakeholder meetings on ongoing projects (M= 3.854, SD= 0.345). The respondents also agreed that supply chain and user departments monitor inflationary, environmental trends that may affect procured goods, works and services (M= 3.786, SD= 0.432).

Concerning risk mitigation practice, the respondents agreed that the organization undertakes training/sensitization for AGPO groups and other suppliers on emerging regulatory requirements (M= 3.863, SD= 0.432). The respondents also agreed that the organization ensures that the contractor submits all required documentation as specified in the bidding documents, the contract to guard against risk of incapable suppliers (M= 3.845, SD= 0.432). In addition, the respondents agreed that with respect to works projects the organization ensures there are adequate controls to ensure timely completion of projects (M= 3.833, SD= 0.367). The respondents also agreed that with respect to works projects the organization ensures there are adequate controls to ensure projects are completed within budget (M= 3.798, SD= 0.321). The respondents agreed that with respect to works projects, the organization ensures that there are adequate controls to ensure material inputs meet the required quality standards (M= 3.791, SD= 0.387). In addition, the respondents agreed that their organization undertakes environmental rehabilitation on its own or through contractual arrangement after works projects (M= 3.776, SD= 0.432). The respondents also agreed that payments to AGPO groups are graduated depending on work done (M= 3.754, SD= 0.398).

Based on the findings as supported by majority of the respondents, it was evident that supply chain risk management practices affected sustainable performance of public procurement in LREB, Kenya as supported by an aggregate mean of 3.824 (SD= 0.399). The study findings agree with those of Chibba (2017) that most organization risk management strategies act as the drivers to any successful organization performance. The study therefore provide evidence that organizational strengths form the core in any risk management framework. Such strengths should deployed be for the achievement of competitive advantage and safeguard against supply chain vulnerabilities. Similarly, Owuor, Oginda, & Obura, (2019) established that supply chain risk management practices had a positive relationship with the supply chain performance. The evidence generated from the study shows that effective risk management governance is the way to manage risk. Stein and Wiedemann (2018) in an empirical study posit that risk governance is a litmus test that demonstrate whether an organization scrutinizes its business model proactively for all possible risks and proactively put in place mitigation measures. Additionally, Kohler and Dimancesco (2020) observed that strong governance measures put in place by public sector organizations greatly reduce unethical risks in public sector supply chains. However, such measures should adhere to high standards of accountability, verifiability and transparency. From the foregoing, it is the conclusion of this study that supply chain risk management practices have a lot of bearing on sustainable public procurement performance.

Table 4.1: Descriptive Statistics on Supply Chain Risk Management Practices

Statements	1 %	2 %	3 %	4 %	5 %	Mean	Std. Dev.
Risk Identification Practices							
Suppliers are required to share cost escalation with your organization	0.7	7.2	13	52.9	26.1	3.954	0.365
Risks register is maintained with respect to ongoing projects	2.1	5.8	10.5	61.1	20.5	3.941	0.406
Environmental risks are always identified and shared with NEMA	4.6	6.7	11.9	56.2	20.6	3.926	0.421
There are mechanisms of identifying collusion among pre-qualified suppliers	2.9	6.4	16.3	55.8	18.6	3.914	0.407

The organization has procedures for identifying and documenting supply chain risks and allocating responsibilities on managing the same	0.6	5.1	26.1	54.5	13.6	3.875	0.429
Ongoing works require convening of forums to identifying potential conflicts with local communities	1.1	11.8	19.8	46.5	20.9	3.856	0.391
Risk Monitoring Practice							
Supply chain and user departments monitor performance of contractors to ensure performance as per cost obligations	1.2	13.4	12.2	57.3	15.9	3.923	0.564
Supply chain and user departments ensure adequate framework to monitor project costs, quality and time performance	1.2	13.8	16.8	56.9	11.4	3.911	0.365
Environmental risks emanating from procured/works projects are continuously monitored to ensure effective compliance	4.1	15.8	21.1	42.7	16.4	3.897	0.342
Engagement frameworks with citizen contractors, AGPO and other disadvantaged groups are reviewed and monitored against set performance standards	1.8	9.4	12.4	67.6	8.8	3.865	0.365
The organization holds community stakeholder meetings on ongoing projects	0.9	11.2	19.5	54.4	14	3.854	0.345
Supply chain and user departments monitor inflationary, environmental trends that may affect procured goods, works and services	0.6	16.8	12.3	54.2	16.2	3.786	0.432
Risk Mitigation Practice							
The organization undertakes training/sensitization for AGPO groups and other suppliers on emerging regulatory requirements	0.7	7.2	13	52.9	26.1	3.863	0.432
The organization ensures that the contractor submits all required documentation as specified in the bidding documents, the contract to guard against risk of incapable suppliers	2.1	5.8	10.5	61.1	20.5	3.845	0.432
With respect to works projects the organization ensures there are adequate controls to ensure timely completion of projects.	4.6	6.7	11.9	56.2	20.6	3.833	0.367
With respect to works projects the organization ensures there are adequate controls to ensure projects are completed within budget	2.9	6.4	16.3	55.8	18.6	3.798	0.321
With respect to works projects, the organization ensures that there are adequate controls to ensure material inputs meet the required quality standards.	0.6	5.1	26.1	54.5	13.6	3.791	0.387
Your organization undertakes environmental rehabilitation on its own or through contractual arrangement after works projects	1.1	11.8	19.8	46.5	20.9	3.776	0.432
Payments to AGPO groups are graduated depending on work done	1.2	13.4	12.2	57.3	15.9	3.754	0.398
Aggregate Score						**3.824**	**0.399**

Test for Hypothesis One

The objective of the study was to assess the influence of supply chain risk management practices on sustainable public procurement performance. The corresponding hypothesis was:

Ho_1: Supply chain risk management practices have no significant influence on sustainable performance of public procurement in LREB, Kenya.

A univariate analysis was therefore conducted to test the null hypothesis. From the model summary findings in Table 4.2, the r-squared for the relationship between Supply chain risk management practices and sustainable public procurement performance was 0.269; this is an indication that at 95% confidence interval, 26.9% variation in sustainable performance of public procurement in LREB, Kenya can be attributed to changes in supply chain risk management practices. Therefore, supply chain risk management practices can be used to explain 26.9% change in sustainable public procurement performance. However, the remaining 73.1% variation in sustainable performance of public procurement suggests that there are other factors other than supply chain risk management practices that explain sustainable performance of public procurement in LREB, Kenya.

Table 4.2: Model Summary for Supply chain risk management practices

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.519[a]	.269	.267	.68365

a. Predictors: (Constant), Supply chain risk management practices

The analysis of variance was used to determine whether the regression model is a good fit for the data. From the analysis of variance (ANOVA) findings in Table 4.3, the study found out that that $Prob>F_{1,131}= 0.000$ was less than the selected 0.05 level of significance. This suggests that the model as constituted was fit to predict sustainable public procurement in Kenya. Further, the F-calculated, from the table (618.61) was greater than the F-critical, from f-distribution tables (3.876) supporting the findings that Supply chain risk management practices can be used to predict sustainable public procurement performance in LREB Kenya.

Table 4.3: ANOVA for Supply Chain Risk Management Practices

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	51.159	1	51.159	618.61	.000[b]
1	Residual	22.816	276	0.0827		
	Total	73.975	277			

a. Dependent Variable: sustainable performance of public procurement in LREB, Kenya
b. Predictors: (Constant), Supply Chain Risk Management Practices

From the results in table 4.4, the following regression model was fitted.

$$Y = 0.292 + 0.476 X_2$$

(X_2 is Supply Chain Risk Management Practices)

The coefficient results showed that the constant had a coefficient of 0.292 suggesting that if supply chain risk management was held constant at zero, sustainable public procurement performance would be at 0.292 units. In addition, results showed that supply chain risk management coefficient was 0.476 indicating that a unit increase in supply chain risk management would result in a 0.476 increase in sustainable public procurement performance. It was also noted that the P-value for supply chain risk management coefficient was 0.000 which is less than the set 0.05 significance level indicating that supply chain risk management was significant. Based on these results, the study rejected the null hypothesis and accepted the alternative that supply chain risk management

has a positive and significant influence on sustainable performance of public procurement in LREB, Kenya.

Table 4.4: Beta Coefficients for Supply Chain Risk Management Practices

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	0.292	.067		4.358	.000
1 Supply Chain Risk Management Practices	.476	.099	.481	4.808	.000

a. Dependent Variable: sustainable performance of public procurement in LREB, Kenya

Conclusions

The null hypothesis test was 'Supply chain risk management practices have no significant influence on sustainable performance of public procurement in LREB, Kenya". The study found that supply chain risk management is statistically significant in explaining sustainable performance of public procurement in LREB, Kenya. The influence was found to be positive. This means that unit improvement in Supply chain risk management practices would lead to an increase in sustainable performance of public procurement in LREB, Kenya. Based on the findings, the study concluded that supply chain risk management practices positively and significantly influences sustainable performance of public procurement in LREB, Kenya.

Recommendations

It's crucial for public procurement authorities in Kenya to conduct comprehensive risk assessments within their supply chains. This involves identifying potential risks, such as supply disruptions, environmental concerns, and ethical issues related to suppliers. Once identified, procurement officials should work on developing effective mitigation strategies. This could include diversifying supplier sources to reduce dependence on a single supplier, monitoring supplier compliance with sustainability standards, and creating contingency plans for handling unforeseen disruptions. Regularly updated risk assessments and proactive risk mitigation strategies will contribute to a more resilient and sustainable supply chain.

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