

**EFFECT OF DEMAND DRIVEN APPROACHES ON SUSTAINABLE  
SUPPLY CHAIN: A CASE OF HOMA-BAY COUNTY GOVERNMENT**

**BY**

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## **DECLARATION**

I, the undersigned hereby declare that this project is my original work and has not been submitted in the same form or any other form to this or any other university or college for any examination.

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This project has been submitted for examination with my approval as the University Supervisor.

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## **DEDICATION**

I dedicate this work to my parents Mr. Elijah Suna and Mrs Maritha Suna who inculcated the spirit of education in me. Equally, I owe this work to my family: loving wife Josephine Suna and children Velama, Harriet, Collins and Melvin for enduring my absence during my study time. May God provide you with more philanthropic.

## ABSTRACT

Devolution is meant to enhance accountability and bring resources closer to the people they intend to serve. However, the implementation of devolution has not been easy, as the County Government of Homa Bay needed to engage in massive procurement in the establishment of County Governments. This has affected the performance levels of the County with performance dropping from 70% in 2016 to 50% in 2017 according to 2017 annual report. Several studies have been done on impact of procurement and Disposal Act of 2005, focusing on the relationship between demands driven approaches on sustainable supply chain. However, no study considered investigating the relationship between stock out and sustainable supply chain, carrying cost and sustainable supply chain and extended lead time and sustainable supply: information on these constructs of demand driven approaches and sustainable supply chain is therefore lacking. The purpose of this study was to investigate the effects of demand driven approaches on sustainable supply chain, taking a case of Homa-Bay County Government. Specific objectives were to establish the effect of stock-outs, examine the effect of extended lead times, and to determine the effect of inventory carrying costs on sustainable supply chain of Homa Bay County Government. This study was anchored on the agile supply chain theory. Correlation research design was adopted on a target population of all 132-procurement staff who were sampled using stratified random sampling technique. Primary data was collected using structured questionnaire. Cronbach's alpha test was used to test the internal consistency of the instrument. A coefficient of 0.878 which is above the threshold of 0.7 was established indicating instruments reliability. For validity test, the instrument was reviewed after which corrections were done. The study established; Stock out has a significant effect on Supply Chain Sustainability ( $\beta = -0.164$ ,  $\alpha = 0.00$ ). Lead time has a significant effect on Supply Chain Sustainability ( $\beta = 0.609$ ,  $\alpha = 0.00$ ). Inventory cost was established to be having a significant effect on Supply Chain Sustainability ( $\beta = 0.468$ ,  $\alpha = 0.00$ ). The results imply that stock out as practiced at the county does not affect sustainable supply. However, inventory cost and lead time were found to affect sustainable supply chain to neither a small extent nor a large extent. Further it was also established that inventory cost was significantly critical in predicting sustainable supply chain. The researcher recommends that information sharing between users and suppliers; adoption of e procurement; and employment of virtual reality during acquisition and placement be embraced. Further studies are recommended on effect of lead time on sustainable procurement. The study findings may be used by Kenyan Policy makers in government and private sectors to come up with strategies and policies that ensure the demand driven approaches on sustainable supply chain in Kenya compete favorably in the global market by meeting both environmental and quality requirements. The study finding might also provide a theoretical and empirical framework for research in demand driven approaches on sustainable supply chain in Kenya and would contribute to the body of knowledge since it might be reference material for future researchers and academicians.

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## **ABBREVIATIONS AND ACRONYMS**

<b>ECR-</b>	Efficient Customer Response
<b>EDI-</b>	Electronic Data Interchange
<b>SCM-</b>	Supply Chain Management
<b>SCS-</b>	Supply Chain Strategy
<b>SPSS-</b>	Statistical Package for the Social Sciences

## OPERATIONAL DEFINITION OF TERMS

<b>Demand Driven Approaches</b>	Demand driven approaches in this study refers to the selection of an appropriate type of supply chain to achieve optimal performance driven by the characteristic of product an organization is manufacturing.
<b>Supply Chain Management</b>	Supply Chain Management in this study is considered as the management and integration of a set of selected key business processes from end user through original suppliers that provide products, services, and information that add value for customers and other stakeholders through the collaborative efforts of supply chain members.
<b>Sustainable Supply chain management</b>	<b>Sustainable</b> supply chain management In this study involves integrating environmentally and financially viable practices into the complete supply chain lifecycle, from product design and development, to material selection, including raw material extraction or agricultural production, manufacturing, packaging, warehousing, distribution, consumption, return and disposal
<b>Sustainable development</b>	Refer development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
<b>Green Supply Chain Management</b>	Refer to green supply chain management as the principle of reducing waste, increasing efficiencies. Effective management of resources, reduce production costs, promote recycling, reuse of raw materials and, reduced production of hazardous substances.

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## **CHAPTER ONE: INTRODUCTION**

This chapter presents a preview to the concept and effects of demand driven approaches on sustainable supply chain, taking the case of case of Homa-Bay County Government. It presents the purpose of the study, objective of the study, and statement of the problem and the limitation of the study.

### **1.1 Background to the Study**

Supply Chain Management (SCM) has gained considerable focus in business as a key success factor for firm competitiveness. Whereas in the past SCM was considered simply a function under operations and restricted to materials management, it has now been appreciated as an all-encompassing strategic discipline. This change has been necessitated by various factors: globalization has increased the competitive space, customers are now more demanding in terms of variety, price and quality of products, the opportunities afforded by technology and the global recession (Palomero & Chalmeta, 2014). This strategic shift has also provided developing countries with an opportunity to benefit from their offerings of affordable labour and raw materials. Osagie (2015) argues that shareholder return maximization has pushed businesses to focus on countries with low cost advantages for their operations; while this has generated employment and foreign investment, it has also led to large supply chains and therefore increased risks and complexity.

This shift in strategic sourcing while harnessing the bottom-line of global corporations has also increased economic activity within poor countries by also enabling joint ventures with local entrepreneurs, for example the “ready-made garment” industry in India. According to UNCTAD (2010), off-shoring of operations has grown significantly and is estimated at between US\$ 250-

300 billion. This presents a great growth opportunity for developing countries but is not without its own challenges. Two major concerns are with ethical engagement of labourers by multinational corporations in less developed countries and the environmental impact of their production activities. Supply chains also face unique operational challenges due to changing purchasing behavior of today's consumers who have access to digital information and are more empowered and expect their needs to be met wherever they want them and exactly when they want (O'Marah, 2015).

Moreover, businesses have to now prove to their consumers that they take product provenance seriously by revealing origins of their products in order to build customer trust and a reputation for sustainable procurement through ethical sourcing of inputs and production of their goods. New (2010) notes that this has led to new technologies within SCM and marketing where at each link throughout the value chain, data accumulates and is passed on at a low cost to the next stage so that consumers as well as supply chain members can trace the finished product all the way back to its origin. These extra efforts by organisations come at a cost that is sometimes not obvious which means there is the extra challenge of controlling costs while responding to the customers' needs (Persson, 2011).

SCM falls in the broad area of strategic management and specifically under operational strategies. Supply Chain Strategy (SCS), as an emerging research area of supply chain management, still needs to develop universally accepted definitions, frameworks and characteristics of application. The main focus of the research on the medium to short-term tactical strategy can be traced to the origin of supply chain management research as a part of operations management field, where the main focus is on tactical levels of planning and decision making (Rose, Singh, and Rose, 2012). It is now evident that SCS cuts across different

functionalities of the organization from manufacturing and marketing to external relations with customers and suppliers.

Rose *et al.* (2012) define supply chain management as “planning, implementing, monitoring, controlling, where possible, and changing, where necessary, all the processes, resources and flows within an extended concept of supply chain which includes all actors in a network, web or system that functions as a whole to provide value from the highest upstream source through various value-adding and modifying nodes, to the end customer”. In the past, SCM and logistics have been used interchangeably; however logistics is a function under SCM. While logistics is concerned with customer service, inventory management, warehousing, information systems and lot size considerations (Lambert and Terrance, 2001) SCM is a set of three or more entities (organizational or individually) directly involved in the upstream and downstream flow of products, services or information from source to customer (Mentzer, Flint, and Hult, 2001).

Organisations focus on improving SCM practices in order to gain competitive advantage for improved organizational performance. According to Ivanov (2010) SCM is now considered as the most popular strategy for improving organisational competitiveness in this century. SCM studies the resources of enterprises and decisions in relation to external collaboration so as to transform and use these resources in the most logical way throughout the entire supply chain, from customers up to raw material suppliers, based on integration, collaboration and coordination (Ivanov, 2010). It is this multi-disciplinary and multi-enterprise reach of SCM that makes it a necessary focus for strategy formulation.

The main focus of SCM is on operational cost reduction, time and response optimisation, customer services or profitability (Nuthall, 2003). It can therefore be concluded that SCM by its

nature has a more significant effect on firm performance (Carter and Narasimhan, 1996). Hence, organizational performance cannot be optimized without supply chain performance consideration. Coherent strategy formulation and implementation is a key success factor for improved supply chain performance. In order for supply chains to be competitive, order fulfillment must be aligned with demand creation (Godsell et al. 2006). Fisher (1997) advocates for the delineation of SCS in accordance with the different demand profiles of a firm's different product types (functional and innovative) in order to maximize success. These product types have different demand characteristics in terms of predictability, life cycles and delivery lead times. He states a belief that the key reason for supply chain problems is the mismatch between product type and the characteristics of the supply chain.

There is now an emphasis in SCM as a tool of functional strategy across the value chain. Purchases constitute 75% of the operating budget for organizations (Quinn, 1997); therefore companies are constantly looking for ways to reduce costs to increase profits and gain competitive advantage. SCS is a series of prioritized objectives focused on processes, reduction in bull whip effect, and smooth flow of information across channels, superior customer service and assured product arrival. Therefore, a well-connected business process improves SCM performance through lowering costs, reducing delivery time, providing appropriate feedback, maintaining low inventory levels, and improving reliability (Davis, 1993). However, as much as organisations may implement these tried and true strategies, there are certain factors that they need to mitigate as well. Ivanov (2010) found that SCM is characterised by increased uncertainty. The uncertainty origins lie both in the environmental (demand fluctuations, machine breakdowns, information system damage) and human (errors, false information interpretation, and disjointed goal pursuit) areas. He recommends that there is an extra need for special

techniques for designing vigorous supply chains, analysis of the solidity of supply chains, monitoring supply chain performance and reconfiguration whenever necessary.

Seuring and Muller (2008) merge the definitions for SCM and sustainability and define SSCM as —the management of material, information and capital flows as well as cooperation among companies along the supply chain while taking goals from all three dimensions of sustainable development i.e. economic, environmental and social into account which is derived from customer and stakeholder requirements. According to the Sustainable Supply Chain Foundation (SSCF), Sustainable Supply Chain Management involves integrating environmentally and financially viable practices such as recycling, refurbishing, waste management etc. into the complete supply chain lifecycle, from product design and development, to material selection, (including raw material extraction or agricultural production), manufacturing, packaging, transportation, warehousing, distribution, consumption, return and disposal. All supply chains can be optimized using sustainable practices. Sustainability in the supply chain encapsulates a number of different priorities: environmental stewardship, conservation of resources, reduction of carbon footprint, financial savings and viability and social responsibility. Sustainable development meets the needs of people today without compromising the ability of people in the future to meet their needs (CIPS, 2014).

Sustainability integrates social, environmental, and economic systems. Social aspects include following applicable laws and international treaties; using open and transparent participatory processes that actively engage relevant stakeholders, establish rights and obligations, and emplace a long-term sustainability plan with periodic monitoring; and ensuring decent wages and working conditions, the safety of workers, and workers' rights to organize and collectively bargain (Mukanga, 2011). Environmental sustainability occurs when processes, systems and

activities reduce the environmental impact of organizations facilities, products and operations. Economic sustainability is used to define strategies that promote the utilization of socio-economic resources to their best advantage. A sustainable economic model proposes an equitable distribution and efficient allocation of resources. The idea is to promote the use of those resources in an efficient and responsible way that provides long-term benefits and establishes profitability (UNGC-Accenture, 2013).

The implementation of devolution has not been easy for county government especially and worse off in Homabay County. The County Government of Homabay needed to engage in massive procurement in the establishment of County Governments. This has affected the performance levels of these County Government with performance dropping from 70% in 2016 to 50% in 2017 according to Homabay County government 2017 annual report. The County government report attributed the fall in performance to among other factors demand driven approaches. It is with this regard that the study proposes to establish the effect of demand driven approaches on sustainable supply chain management.

## **1.2 Statement of the Problem**

One of the strategic goals of the National Government for the year 2012 was to enhance devolution in all sectors in Kenya. While the study appreciates the extent of Kenya's devolution of authority to various tiers of the local government, the level of empowerment through democratization, participation, accountability, responsibility and efficiency, effective use of resources is still a big debate. Devolution is meant to enhance accountability by bringing politicians and resources closer to the people they are intended to serve. However, the implementation of devolution has not been easy as the County Government needed to engage in massive procurement in the establishment of County Governments. This has affected the

performance levels of these County Government. Several studies have been done on impact of procurement and Disposal Act of 2005. Sound public procurement policies and practices are among the essential elements of good governance (KIPPRA, 2006; World Bank, 2002). According to corruption perception index (2010) Kenya is ranked 139th out of 176 with the least corrupt countries at the top. Homa Bay County Government suffers from neglect, lack of proper direction, poor co-ordination, slow with a lot of bureaucracy, lack of open competition and transparency, differing levels of corruption and not having a cadre of trained and qualified procurement specialists who are competent to conduct and manage the procurement process in a professional, timely and cost effective manner, The implementation of the procurement Act 2005 and the subsequent regulations and guideline have faced many challenges under the devolved system of governance in Kenya generally and Homa Bay County in Particular. Local studies have been done on the area of procurement performance have focused on the effect of procurement process in companies, analyzed the effect of procurement activities on the operation and effectiveness of public sectors in Kenya. A study on supply chain management practices and their impact on performance among humanitarian organizations in Kenya, using a population of twenty eight humanitarian organizations concluded that they should come up with mechanisms that will enable them to overcome various challenges in their supply chains such as use of technology to speed up work, effective and efficient internal operations inter-organizational integration and continuous improvement in the organization. Abdi (2012) examined procurement practices of public state corporations in Kenya. A procurement review by PPOA (2010) of the Narok North District on compliance with the law, regulations, internal controls, generally accepted principles and institutional framework found out that there were deviations in general

and specific areas of procurement stages. However, the reviewed studies failed to address the context of demand driven approaches on sustainable supply chain.

### **1.3 Objectives of the Study**

The general objective of this study was to establish the effects of demand driven approaches on sustainable supply chain of Homa-Bay County Government

This study was guided by the following specific objectives;

- i. To establish the effect of stock-outs on sustainable supply chain of Homa Bay County Government.
- ii. To determine the effect of extended lead times on sustainable supply chain of Homa Bay County Government.
- iii. To examine the effect of inventory carrying costs on sustainable supply chain of Homa Bay County Government.

### **1.4 Research Hypotheses**

- H<sub>01</sub> Stock-outs costs has no significant influence on sustainable supply chain of Homa Bay County Government.
- H<sub>02</sub> Extended lead time has no significant influence on sustainable supply chain of Homa Bay County Government.
- H<sub>03</sub> Inventory carrying costs has no significant influence on sustainable supply chain of Homa Bay County Government.

### **1.5 Justification of the Study**

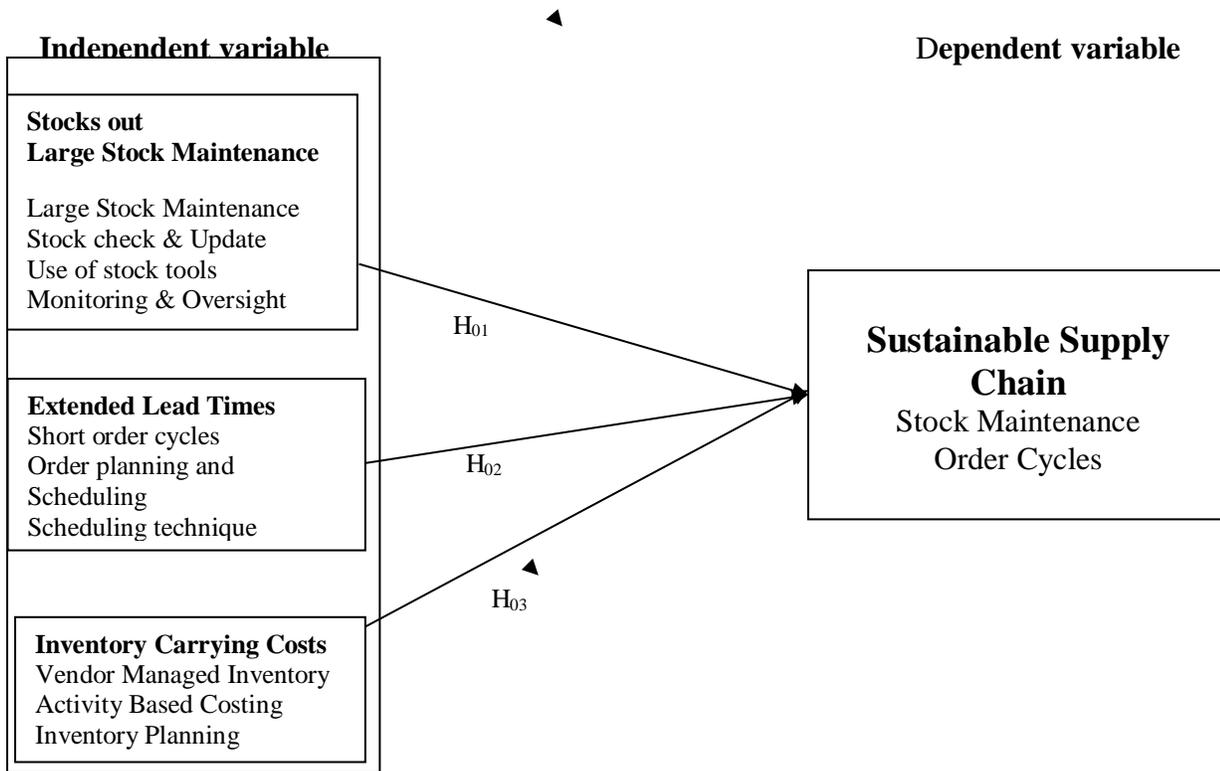
The information might be used by Kenyan Policy makers in government and private sectors to come up with strategies and policies that ensure the demand driven approaches on sustainable supply chain in Kenya compete favorably in the global market by meeting both environmental and quality requirements. The study might also provide a theoretical and empirical framework for research in demand driven approaches on sustainable supply chain in Kenya and would contribute to the body of knowledge since it might be reference material for future researchers and academicians.

### **1.6 Scope of the Study**

The study will focus on the effects of demand driven approaches on sustainable supply chain; a case of Homa Bay County Government performance on sustainable supply chain performance. Besides, the present study will be conducted during the month of February to August 2018.

### **1.7 Conceptual Framework**

Conceptual Framework is a diagrammatic explanation of the research problem hence an explanation of the relationship among several factors that have been identified as important to the study (Ngechu, 2006). The conceptual framework provides a basis for understanding the multiple connections between the variables under study.



**Figure 1. 1: Conceptual Framework of the Relationship between Demand Driven Approaches and Sustainable Supply Chain**

**Source: (Author, 2018)**

The conceptual framework depicts that Large Stock Maintenance, Stock check & Update, Use of stock tools; Monitoring & Oversight would influence Order Cycles. A high cost of stock-out valuation will result in higher inventories and higher service levels. Equally Short order cycles, Order planning and scheduling and scheduling technique will influence Order Cycles. Extended lead time is the time it takes a process to run from start to end. Vendor Managed Inventory, Activity Based Costing and Inventory Planning will influence Order Cycles. Inventory carrying costs form an interesting concept, representing both accounting costs and economic costs. Inventory costs could emanate from holding costs, costs of stock outs, acquisition costs.

## **CHAPTER TWO: LITERATURE REVIEW**

This section reviews the literature from previous studies and works related to the study phenomena. It also provides the theoretical framework that the study is anchored upon.

### **2.1 Theoretical Framework**

#### **2.1.1 The Agile Supply Chain Theory**

The market environment has become more dynamic and turbulent; companies need to adopt new supply chain strategy for them to remain competitive. Supply chain management is now moving away from traditional processes to agile capability of competitive bases of speed, flexibility, innovation, quality, and profitability through the integration of reconfigurable resources and best practices in a knowledge-rich environment to provide customer-driven products and services in a fast changing market environment (Yusuf *et al.*, 2004). Agility is a business-wide capability that embraces organizational structures, information systems, logistics processes and in particular, mindsets (Christopher, 2000). Lee (2004) argues that supply chain agility aims at responding quickly to short-term changes in demand or supply and ensure that the company handles external disruptions smoothly. Christopher (2000) identified four characters of agile supply chain that included sensitivity, virtuality, process integration and network based. Process integration means collaborative working between buyers and suppliers, joint product development, common systems and shared information.

Agile supply chain is market sensitive and needs the supply chain members to be able to read and respond to the market demand. The supply chain members should show the willingness to create an environment in which information can flow freely in both directions in the chain for them to achieve a more agile supplier base. Christopher (2000) argues that leveraging supplier

relations allows companies to create agile supply chains by reducing lead time between organizations. The leverage of respective strengths and competencies of network partners assists to achieve greater responsiveness to market needs (Christopher, 2000). Krajewski *et al.* (2009) asserts that efficient supply chain has the qualities of make to stock, low capacity cushion, low inventory investment, short lead time, emphasis low process with consistent quality and on time delivery while for responsive supply chain include assemble to order with emphasis on product variety operational strategy, high capacity cushion, just as needed inventory to enable fast delivery time, shorten lead time and emphasis on fast delivery time, customization, and flexibility. It is through information sharing and collaboration that the company as a whole will have responsibility in assisting its external suppliers to improve quality, delivery time and service performance. This requires real time market feedback on actual customer requirements without making forecasts based upon past sales or shipments.

The use of information technology has helped the organizations to capture data on demand through Efficient Customer Response (ECR) from point –of –sale or the point of use hence increasing the responsiveness in process industries. Efficient Customer Response (ECR) is designed to integrate and rationalize product assortment, promotion, new product development and replenishment across the supply chain hence increasing emphasis on key areas such as EDI, cross- docking and continuous replenishment (Harrison & Van Hoek, 2008). Implementing e-business to streamline business processes provide windows into operations, integrating the supply chain, increase customer services and streamline distribution (Rao 2002). Porter (2008) opine that the adoption of information technology will change the competitive environment in three ways, namely through changing the structure of the industry, changing the rules of

competition, and giving businesses new methods by which to gain competitive advantage over the competition.

Information technology help to communicate between upstream and downstream partners hence creating a virtual supply chain that is information based rather than inventory. Virtual supply chain ensures information is shared among partners thereby forming a process alignment through collaboration that is linked together as a network. Electronic Data Interchange (EDI) and the internet have made it possible for partners in the supply chain to share the same data rather than waiting for that extended chain to transmit data from one step to another. The company that are market driven can easily realize agility by investing in product research and modern information technology that enables it to react quickly to the fluctuations in product demand and sourcing problems.

### **2.1.2 Stock Out cost**

Inventory management is influenced by the nature of demand including whether demand is derived or independent. Inventory levels are affected by customer service expectations, demand uncertainty, and the flexibility of the supply chain (Ballou, 2004). For products characterized by erratic demand, a short life cycle or product proliferation, a more responsive supply chain and larger buffer inventories may be needed to meet a desired customer service level. Inventory costs fall into three classes: carrying costs of regular inventory and safety stock, ordering or set up costs, and stock- out costs. Inventory control systems balance the cost of carrying inventory against the cost associated with ordering or shortfalls. Service level goals can differ by the value placed on stock- outs and indirectly carrying costs. A high cost of stock- out valuation will result in higher inventories and higher service levels. A constant availability of stock provides a continuous uninterrupted customer service. The Item Fill Rate (IFR) Measures how a particular

by product (Often called a stock keeping unit or SKU) is available (Wilson, 2004). Stock levels should be maintained to minimum level so as not to incur unnecessary stock holding cost but always available for continuous service to customers. Careful analysis can identify an economic order quantity (EOQ), being the quantity of an item that should be regularly ordered so as to minimize total cost of ordering and holding cost. If stock-out occurs, different scenarios will happen.

Subject to distribution inventory stock out or manufacturing inventory stock-out, the impact on the supplier and the customer is different in terms of extent and scale, i.e. the impact is greater and more serious for one party than the other one. So the attitude toward stock-out varies accordingly. For instance, if there is a manufacturing inventory stock-out in the manufacturing companies like Ford and Toyota, the result is critical. The production line will be shut down and startup costs are very high. Hence such stock-out is prohibited. In case of distribution inventory stock out, the impact on the customer is usually not big and serious, e.g. it is not a big deal when consumers encounter such a stock-out, therefore their counterparts-the suppliers, such as wholesalers and retailers, tolerate stock-outs. When a supplier is unable to satisfy demand with available inventory, one of four events may occur: (1) the customer waits until the new replenishment arrives; (2) the customer back orders the product; (3) the sale is lost; (4) the customer is lost (Coyle et al., 2003). For most companies, the four results are listed from best to worst in terms of the impact. Stock-out Costs is the cost associated with the lost opportunity caused by the exhaustion of the inventory. The exhaustion of inventory could be a result of various factors.

### **2.1.3 Extended Lead Time**

Lead time is defined as the latency between the initiation and the execution of a process. Lead time is the key issue for enhancing performance of organisations across various industries (Treville *et al.* 2004). Lead time is a major consideration for retailers and customers in the supply chain. Higher levels of integration results in reduced lead times. Chopra, Reinhardt and Dadahardt (2004) showed that by decreasing the lead time uncertainty, the required safety stock increases. Singh, Sohani and Marmat (2013) noted that in an information-enriched supply chain, firms are closely connected with suppliers and customers both internally and externally because of information sharing resulting in reduced lead time and increased performance. Extended lead time is the time it takes a process to run from start to end.

Lead time can be measured in a number of ways, including manufacturing lead time (Jayaram, Vickery & Droge 1999) and customer lead time (Duenyas & Hopp 1995). Customer lead time is the time elapsed from receipt of an order until the finished product is either shipped or delivered to the customer. Grönroos (2001) emphasized the importance of lead time in the experience of inventory management, similar to the idea proposed by Lehtinen and Lehtinen (2002). Customers bring their earlier experiences and overall perceptions of a service firm to each encounter because customers often have continuous contacts with the same service firm (Grönroos, 2001).

Therefore, the lead time issue was introduced as yet another important component in the perceived quality inventory management model, so that the dynamic aspect of the service perception process was considered as well. A favorable and well-known time strategy is an asset for any firm because it has an impact on customer perceptions of the communication and operations of the firm in many respects. If a service provider has a strong inventory management

in the minds of customers, minor mistakes will be forgiven. If mistakes often occur, however, the image will be damaged. If a provider's image is negative, the impact of any mistake will often be magnified in the consumer's mind. In a word, lead-time can be viewed as a filter in terms of a consumer's perception of quality Parasuraman *et al.* (2005).

Lead-time has to live up to service promises, especially if the service provider is “claiming” the quality service position in the firming industry. According to Navon & Berkovich (2006), the main logistic responsibility in any organization is to formulate master programme for the timely provision of materials, components and work-in progress. Stevenson (2001), explained that logistics, including materials and goods flowing in and out of a production facility as well as its internal handling has become very important to an organization to acquire competitive advantages, as the company’s struggle to deliver the right product at the correct place and time. The main aim is to actually promote, with low cost, a flow whose velocity allows the execution of manufacturing process with expected satisfaction level. Bowersox & Closs (2002), articulated that improvement in continuity of supplies with reduced lead times, will lead to improvement in cooperation and will also enhance cooperation’s and Communications with reduced duplication of efforts, reduction in material costs and improvement in quality control, which are the main benefits of materials management.

#### **2.1.4 Inventory Carrying Cost**

There are costs associated with holding all inventories, and the costs go beyond the expenditure of the inventory investment. Inventory carrying costs form an interesting concept, representing both accounting costs and economic costs (Goldsby *et al.*, 2005). A carrying cost is the expense associated with holding inventory over a period of time. In other words, it's the cost of owning, storing, and keeping inventory to be sold to customers. Accounting costs are explicit and call for

a cash payment. Economic costs are implicit, not necessarily involving an outlay but rather an opportunity cost. The capital cost is the single biggest factor of inventory carrying cost. It is opportunity cost; to clarify its sense, just think about what else could be done with the amount of capital if it were not tied up in inventory? Inventory is viewed as an asset on the balance sheet; hence, many state governments impose property tax rates on inventory. Insurance premiums are paid to provide coverage against loss or damage to inventory. Obsolescence reflects the real possibility that inventory value may decline in the course of being kept. Storage costs in this figure just refer to variable costs of storage. Fixed warehousing costs, which do not change with the volume of inventory maintained, are not included in inventory carrying costs but are calculated as warehousing costs in a total logistics cost.

Inventory costs could emanate from holding costs, costs of stock outs, acquisition costs. First, acquisition costs: acquisition costs include preliminary costs for preparing requisition, vendor selection, negotiation costs; placement costs such as order preparation, stationery costs and post-placement costs which include receipt of goods, material handling, inspection and payment of invoices. Secondly, holding costs are storage costs-space, rates, light, heat and power costs; labour costs that relate to handling, clerical and inspection; cost of insurance; interest on capital tied up; costs of deterioration, obsolescence and pilferage. Other costs relate to stock outs: costs associated with lack of inventory. These costs are; loss of production output, costs of idle time, loss of customer goodwill and costs of rectifying the stock out. Whether you are making an adjustment to record monthly sales or to account for inventory loss, you must determine the cost of the items. The cost includes the actual price of the goods and also any shipping or freight costs you must pay to receive the items. Inventory cost does not include outbound freight to ship

orders to customers, interest paid if you finance your purchases, storage or warehousing of your inventory or insurance on the inventory in your possession ( Roels, & Perakis, 2006).

Effective cost management and reduction in inventory management can be a road map to achieving your most critical organizational objectives. With careful planning and good cost reduction techniques and planning, purchasers by use of inventory management can save big amount of company's budget major concepts in cost in purchasing are price, cost, and total value analysis. The nature, purpose, scope and benefits of inventory management in reducing costs associated with inventory make it suitable for different applications (Marcus and Keil, 2004;Kaplan and Sahney, 2000). Characteristics of inventory management are highlighted to have important determinant of cost reduction in organizations. The value of inventory management is defined as the benefit over costs of implementing. Inventory management is justified only when the perceived benefit is large enough to cover the cost. Inventory management offer a practice-intensive learning experience to anyone responsible for selecting suppliers, negotiating prices and fees, and purchasing goods and services. Adoption of inventory management is effective on Cost Management in performance of food processing companies.

According to (Shaw & Subramaniam, 2002), the value of inventory management can be defined as price benefits plus transaction minus technology lock in cost. Price benefits result from saving in theft, obsolescence, damage, holding capital and cost of ordering, cost of carriage and shortage cost. Lower inventory cost is a definite advantage for the company that effectively controls its inventory. Business owners need to fully understand the costs of carrying inventory, not just how much the inventory costs to purchase. Inventory carrying costs consist of all the expenses a company incurs for owning inventory. These expenses include the cost of capital, storage and risks costs (including obsolescence, damage, theft and deterioration) plus the appropriate taxable

amounts. Effective inventory control reduces these costs because it reduces the total amount of inventory required to manage the business. Inventory control monitors the level of inventory and proactively manages obsolescence and deterioration by ordering in the appropriate quantities. Effective inventory control also reduces storage costs, because it orders enough inventories to fill consumer demand and not much more (Perakis, &Roels, 2010).

Well-defined inventory control policies can reduce the labor costs associated with managing the inventory. Each time inventory gets handled, whether to move it from one location to another, to retrieve it for order picking or to put it away for storage, it involves labor. This handling makes up part of the cost associated with managing inventory. Companies prefer to handle the inventory as little as possible. When a company constantly searches for lost inventory, moves inventory from one location to another because of poor space utilization or handle the inventory multiple times, it results in increased labor costs. Properly managed inventory reduces these incidents and reduces the labor cost associated with the inventory (Jordan, 2007).

### **2.1.5 Sustainable Supply Chain Management**

Seuring and Muller (2008) merge definitions for SCM and sustainability and defined SSCM as “the management to material, information and capital as well as cooperation among companies along the supply chain while taking goals from all three dimensions of sustainable development, i.e., economic, environmental and social into account which is derived from customer and stakeholder requirements.” According to the Sustainable Supply Chain Foundation (SSCF), Sustainable Supply Chain Management involves integrating environmentally and financially viable practices such as recycling, refurbishing, waste management and so forth into the complete supply chain lifecycle, from product design and development to material selection (including raw material extraction or agricultural production), manufacturing, packaging,

transportation, warehousing, distribution, consumption, return and disposal. Supply chain sustainability is based on the principle that socially responsible products and practices are not only good for the environment, but are important for long-term profitability.

All supply chains can be optimized using sustainable practices. Sustainability in the supply chain encapsulates a number of different priorities: environmental stewardship, conservation of resources, reduction of carbon footprint, financial savings as well as viability and social responsibility. Sustainable development meets needs of people today without compromising the ability of people in future to meet their needs (CIPS, 2014). Sustainability integrates social, environmental, and economic systems. Social aspects include following applicable laws and international treaties using open and transparent participatory processes that actively engage relevant stakeholders, establish rights and obligations, and emplace a long-term sustainability plan with periodic monitoring; and ensuring decent wages and working conditions, the safety of workers, and workers' rights to organize as well as collectively bargain (Mukanga, 2011). Environmental sustainability occurs when processes, systems and activities reduce the environmental impact of organizations' facilities, products and operations.

Economic sustainability is used to define strategies that promote utilization of socio-economic resources to their best advantage. A sustainable economic model proposes an equitable distribution and efficient allocation of resources. The idea is to promote use of those resources in an efficient and responsible way that provides long-term benefits as well as establishes profitability (UNGC-Accenture, 2013) Kovacs (2014) opines that supply chain sustainability is a holistic perspective of supply chain processes and technologies that go beyond the focus of delivery, inventory and traditional views of cost. This emerging philosophy is based on the

principle that socially responsible products and practices are not only good for the environment, but also they are important for long-term profitability. Therefore, sustainability is a business strategy that drives long-term corporate growth and profitability by mandating inclusion of environmental and social issues into the business model. It is intended to generate a maximum increase in company, consumer and employee value by embracing opportunities including managing risks derived from environmental as well as social developments.

## **2.2 Empirical Literature Review**

### **2.2.1 Stock out and Sustainable supply chain**

Li *et al.* (2006) investigated the impact of supply chain management practices on competitive advantage and organizational performance. Supply chain management practices identified were strategic supplier partnership, customer relationship, level of information sharing, quality of information sharing and postponement. The results showed that the organizations with high level of Supply chain management practice can lead to enhanced competitive advantage and improved organizational performance. The study was carried out in USA and metrics for measuring organizational performance using both financial and market criteria, included return on investment (ROI), market share, profit margin on sales, the growth of ROI, the growth of sales, the growth of market share, and overall competitive position.

Osoro *et al.* (2015) analyzed the effect of crude oil price as a determinant on performance of supply chain systems in the petroleum industries in Kenya. The study employed a censuring sampling frame due to the fact that the targeted populations of entire stakeholders was about 73 companies who are involved daily in the oil industry management. It was established that cost of crude oil affects performance of supply chain systems in the petroleum industries.

Namasenge and Biraori (2015) conducted study that aimed at assessing the effect of supplier relationship on the effectiveness of supply chain management practices in Kenyan public sector: case of Ministry of Finance. The study identified that lack of supplier relationship management strategies lowered the effectiveness of supply chain management functions.

Previous studies reviewed (Namasenge and Biraori (2015), Osoro *et al.* (2015) , and Li *et al.* (2006) have attempted to investigate the relationship between demand driven approaches and sustainable supply chain. However no study reviewed looked at the relationship between stock out and sustainable supply chain. Information on the relationship between stock out and sustainable supply chain is therefore lacking.

### **2.2.2 Extended lead time and sustainable supply chain**

Sukati *et al.* (2011) investigated the relationship between supply chain management practices and the competitive advantage of firm. Supply chain management practices that he adopted included supplier partnership, customer relationship and information sharing. The study was conducted in Malaysia manufacturing industry by sending questionnaires to 200 supply chain practitioners. The study showed that there is a positive relationship between supply chain management practices and the competitive advantage of the firm.

Okello and Were (2014) conducted the study on the Influence of supply chain management practices on performance of the Nairobi securities exchange's listed, food manufacturing companies in Nairobi. The study identified product development processes, inventory management, lead time, technology and innovation as supply chain management practices in the study. They asserted that five Supply chain management practices have a significant influence on the performance of food manufacturing companies in Kenya. They suggested that supply chain

interventions need to be put in place to address issues such as negotiating contracts with external suppliers, involvement of E-procurement, creation of a close relationship with suppliers and provision of continuous tracking over the physical movement of inventor.

Previous studies reviewed Okello and Were (2014) and Sukati *et al.* (2011) have attempted to investigate the relationship between demand driven approaches and sustainable supply chain. However no study reviewed looked at the relationship between extended lead time and sustainable supply chain. Information on the relationship between extended lead time and sustainable supply chain is therefore lacking.

### **2.2.3 Carrying cost and sustainable supply chain**

Ibrahim and Hamid (2012) carried out a study on supply chain management practices and supply chain performance effectiveness in manufacturing companies in Sudan. They collected through questionnaires by sending to supply chain managers or top-level executives in 150 large manufacturing corporations among Sudanese listed in and registered in ministry of industry. They found that Integration, information sharing, customer management and speed of responsiveness were the supply chain management practices that were adopted in the study. The study revealed that there is a positive relationship between supply chain management practices and performance through effectiveness.

Sari (2009) investigated the Framework for analyzing and developing information integration. A study on steel industry maintenance service supply chain. The aim of his study was to understand the meaning, constituents, extent, and development means of information integration in service supply chain context. He argued that service providers should be integrated to the supply chain just like other supply chain members as it contributes to the supply chain performance. Gustav

and Mankowitz (2008) aimed at investigating Supply Chain Management in the Swedish steel industry. It specifically investigated how actors in the industry regard their supply chains in relation to their overall strategy and what implications industry specifics have when the flow of material and information is to be optimized. A study by Toyin (2012) carried out in Nigerian manufacturing companies on the impact supply chain management practices on the performance revealed that information sharing, information quality, lean system and postponement has positive effect on Supply chain management performance of Nigerian manufacturing companies.

Musuya and Namusonge (2013) assessed the factors that affect the implementation of JIT supply chain practices in public health sector in Kenya and found that product demand/ supply stability variable influence on the ability to implement JIT in Ministry of public health. Mutuetandu and Iravo (2014) investigated the impact of Supply Chain Management Practices on Organizational Performance: A Case Study of Haco Industries Limited (Kenya).The study found out that supply chain management practices like customer relations, strategic partnerships, training and information sharing have a positive effect on the organization's performance. Kimani (2013) investigated the supply chain management challenges in Kenya petroleum industry: Case of national oil corporation of Kenya and found out that four independent variables namely; information technology, supply chain design, collaboration issues and people issues are very critical to effective supply chain management in the petroleum sector.

Okemba and Namusonge (2014) conducted research to establish whether reverse logistics as green supply chain management practices determines supply chain performance in Kenya's manufacturing firm: A case study of Nairobi based firms in the food and beverage sector. Findings revealed that the firms in focus had adopted GSCM practices to a great extent, was however there was a disconnect between adoption and practice in that, respondents affirmed that

they had incorporated recyclable content as well as ensured reusability of their packaging but when it comes to collecting the same used packages under reverse logistics, a significant percentage (46%) was non-committal on whether they collect from customers/return to their suppliers.

Okanda, Namusonge and Waiganjo (2016) investigated the influence of supply planning practice on the performance of the unit of vaccines and immunizations in the Ministry of health, Kenya and found out that supply planning practices such as optimum inventory procurement, determination of health requirements of health facilities at every node, aggregate determination requirements and joint coordination with suppliers if adopted by the unit of vaccines and immunizations will increase the performance positively

Although the studies carried out by Mutuetandu and Iravo (2014) addressed some variables in this study, this study was not carried out in steel manufacturing companies in Kenya. The studies carried out in steel industry, were either done in developed countries like Sweden (Gustav & Mankowitz, 2008) and Finland (Sari, 2009). Most of studies done in Kenya did not address specifically the steel manufacturing companies and the variables used as supply chain management practices were different from the one used in this study. Hence there was need for an empirical study to be carried out in steel industry in Kenya. The study adopted the supply chain management practices that included supply chain collaboration practice, Green Supply Chain Management Practice, Information Sharing Practice and Customer relationship management Practice.

Previous studies reviewed Ibrahim and Hamid (2012), Mutuetandu and Iravo (2014), Okanda, Namusonge and Waiganjo (2016), have attempted to investigate the relationship between

demand driven approaches and sustainable supply chain. However no study reviewed looked at the relationship between carrying cost and sustainable supply chain. Information on the relationship between carrying cost and sustainable supply chain is therefore lacking.

### **2.3 Summary of Knowledge Gaps**

The reviewed studies (Namasenge and Biraori (2015), Osoro *et al.* (2015) , and Li *et al.* (2006) have attempted to investigate the relationship between demand driven approaches and sustainable supply chain. However no study reviewed looked at the relationship between stock out and sustainable supply chain. Information on the relationship between stock out and sustainable supply chain is therefore lacking.

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## **CHAPTER THREE: RESEARCH METHODOLOGY**

This chapter outlines the research design adopted by the study, the target population, sample and the sampling procedures, data collection, validity and reliability and data analysis methods and presentation.

### **3.1 Research Design**

Kerlinger (1973) defines research design as an arrangement of conditions for collecting and analyzing of data in a manner that aims to combine relevance to the research purpose with economy in procedure. It is the conceptual structure within which research is conducted; it constitutes the blueprint for the collection, measurement and analysis of data. Orodho (2003) defines research design as the scheme, outline or a plan used to generate answers to research problems. Correlation research design was adopted used in this study. According to Kothari (2008) correlation research design determines the frequency with which a variable occurs or its association with other variables. This design helped in looking at the association between independent variables and dependent variables.

### **3.2 Study Area**

Homa Bay County number 043 is located in Western Kenya and borders Kisii County and Nyamira County to the South-East, Kericho County to the East, Kisumu County to the North and Lake Victoria to the North-West. It lies between 0° 40' and 0° South and longitude 34° and 34° 50 east (Republic of Kenya, 2009). Homa Bay is popularly known as the Bay County because of its many bays. It has breathtaking islands with the most famous being Rusinga and Mfangano, hills, valleys and the longest shores of Lake Victoria. With 80% of Kenya's Lake Victoria in Homa bay, the county leads as the supplier of fresh lake fish in Kenya. According to the 2009 Kenya Population and Housing Census, it has a population of 963,794 with a

population density of 303 people per Km<sup>2</sup> and an annual growth rate of 2.7%. It covers an area of 3,183.3Km<sup>2</sup>.

### **3.3 Target Population**

Cooper & Schindler (2001), defined population as the total collection of elements about which we wish to make some inferences. The study population constituted all the procurement Directors, administrators and members of the procurement department. According to the Homa Bay county Government Human resource department there is 132 procurement staff. The study adopted purposive sampling which was done in order to select respondents who were directly engaged in procurement.

### **3.4 Sample and Sampling Technique**

Sampling is a procedure of using a small number of items or part of the whole population to make conclusions regarding the population. It enables the researcher to estimate some unknown characteristics of the population and make generalization, (Zikmund, 2003). The study purposively targeted the procurement director and administrators, and members of the procurement department. Purposive sampling as a technique allowed the researcher to use cases that have the required information with respect to the objectives of the study (Gay, 2006). The respondents who participated in the study were stratified into strata using stratified random sampling technique. Simple random sampling method was used to select the procurement officers of Homa Bay County who were given equal chance of being selected per strata. A sample of respondents operating for the last three years were selected using Yamane's (1967) formulae

$$n = \frac{N}{1 + Ne^2}$$

Where

n = optimum sample size

N = number of staff directly engaged with procurement

e = probability error

In the study, n=132

$$1+132(0.05)^2$$

Therefore the sample size was 99 respondents.

### **3.5 Data Collection Method**

The study used Likert scale questionnaires to collect data from respondents who were procurement officers depending on different departments. It was used to obtain information and to provide an opportunity for the researcher to capture respondent's views on a whole range of issues. This tool was used to collect the primary data for the study. Questionnaires in general are needed to ensure uniformity, cost savings and time savings. The questionnaire comprised of questions on personal data and questions relating to demand driven approaches on sustainable supply chain.

#### **3.5.1 Data Source**

The study used primary data which was collected from the procurement staff of Homabay County.

### **3.5.2 Piloting**

To ensure reliability and validity of the questionnaire, pilot test will be done using 13 respondents from Migori County, procurement department. The time of completion was recorded and how well the question is understood and answered was ascertained. The pilot test was performed twice in a span of one week.

### **3.5.3 Reliability Instruments**

According to Meller, (2001) reliability of measurement concerns the degree to which a particular measuring procedure gives similar results over a number of repeated trials. Cronbach's alpha test of internal consistency was used to test the findings from the gathered data during a pilot study and a coefficient of 0.878 which is above the threshold of 0.7 which is the cutoff point (Meller, 2001) established indicating instruments reliability.

### **3.5.4. Validity of the Study**

Patton (2002), states that validity and reliability are two factors which any researcher should be concerned about while designing a study, analyzing results and judging the quality of the study. Validity test, according to Saunders, Lewis and Thornhill (2007) is the degree to which a test measures what it is supposed to measure. According to Mugenda (2008), content validity was ensured by literature searches to ensure that items were based on the study concepts. This was also corroborated by expert judgment and the mitigation of corrections given by the supervisors. Consequently, the advice of supervisors and practitioners who are experts in the field was also sought and incorporated.

## **3.6 Data Analysis**

This study used quantitative data analysis method. Descriptive statistics such as frequency distribution and percentages was used to analyse biographical information of study respondents,

while Pearson's correlation and multiple regressions was used to analyse the relationship between elements of stocks out, extended lead times, and inventory carrying costs, and demand driven approaches as recommended by Hair, Babin, Money & Samouel (2003). These variables were tested from a general multiple regression equation of the form:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \epsilon$$

Where Y= measure the key indicator being demand driven approaches

$\beta_0$  =Constant

$\beta_1$  to  $\beta_5$  =Regression coefficients

$X_1$  = Effect of stocks out

$X_2$  = Effect of extended lead times

$X_3$  = Effect of inventory carrying costs

$\epsilon$  = Coefficient of error

A partial regression coefficient represents the change in dependent variable, due to one unit change in independent variable; e is the margin term.

### **3.8 Ethical Consideration**

The researcher distributed questionnaires to respective respondents accompanied by a letter of introduction upon approval by Maseno University School of Graduate Studies (SGS) and Maseno University Ethical Review Committee (MUERC) The letter provided details concerning the researcher, the research and the objectives of the research. It also provided details on how participants' information would be addressed including confidentiality issues. The researcher ensured responsible use of data and respected the dignity and welfare of anyone the researcher worked with. The study adhered to the universal principles underlying research such as honesty and respect for the rights of individuals or personalities in the study. Informed consent as Grey

(2002) points out is an important ethical norm any researcher should consider. No participant was forced to either answer any question they did not feel comfortable with or disclosed information they did not wish to divulge. Responses given by an individual were not be shared by any other persons except those directly involved in the study and were only be used for academic purposes. The researcher paid attention to plagiarism. No work was used without attribution. The researcher also ensured that every work was not used verbatim and that proper paraphrasing was ensue.

## CHAPTER FOUR: RESULTS AND DISCUSSIONS

This chapter presents data analysis and findings of the study in two major sections. The first section provides demographic characteristics of the respondent of the study, while the second section gives out the results and discussions of this research.

### 4.1 Demographic Characteristics of the Sample

The first section of the study questionnaire enquired about demographic information of the study respondents. This information was categorised as gender, age, station, academic level, and period of service of the respondents. Characteristics of respondents are presented in Table 4.1.

**Table 4.1: Characteristics of Study respondents**

Characteristic	Category	Frequency	Percentage
Gender	Male	34	34
	Female	65	65
Total		99	100
Level of Education	Primary	00	00
	Secondary	15	15
	Under graduate	28	28
	Post graduate	26	26
	Diploma	20	20
	Others	10	10
Total		99	100
Number of years in the company	0-1 years	11	11
	1-5 years	25	25
	6-10 years	32	32
	Above 10 years	31	31
Total		99	100

**Source: Survey data (2018)**

Table 4.1 illustrates that majority (66%) of the sampled respondents were males, while female respondents were 4%. This result is an indication that most jobs in the procurement department at the county have been taken up by women. The Table also analyses the education levels of the study respondents. It illustrates that 28% of the respondents had undergraduate level of education; 26% had post graduate level of education; 20% had diploma level of education; 15%

had secondary level of education, while 10% had other levels of education that were not presented in the questionnaire. With only 15% of the sampled respondents with secondary level of education, it can be concluded that the staff at the supplies chain department were fairly qualified academically, hence were in a better position to provide appropriate answers to questions as posed by the study.

Table 4.1 also indicates that 32% of the sampled respondents had served in the procurement department for between 6 and 10 years. Additionally, 31% of the employees had been at the same department for over 10 years while 25% of them had stayed in procurement department for between one and five years. The remaining 12% of the sampled employees had stayed in the company for less than one year. With over 60% of the staff having more than six years of work experience at the procurement department, it was expected that they were well conversant with practices that could enhance sustainable supply chain in the organization.

## **4.2 Demand Driven Approaches on Sustainable Supply Chain**

The second part of the questionnaire examined the study variables: effect of demand driven approaches on sustainable supply chain. It begins by assessing the dependent variable.

### **4.2.1 Indicators of Sustainable Supply Chain**

The second section of the study tool sought to establish the indicators of sustainable supply chain at the supply chain department. In this regard, respondents were asked to state their level of agreement with regard to various indicators presented in the questionnaire have been realised at the county using a scale of: Key: 5- Strongly agree 4- Agree 3- undecided 2- Disagree 1- Strongly disagree was used to measure the responses from respondents. Table 4.2 illustrates the Mean (*M*) of responses obtained through descriptive statistics.

**Table 4.2: Indicators of Sustainable Supply Chain**

Indicators of sustainable supply chain		M	1	2	3	4	5
1	Reduction in process cost	1.36	47.3	26.3	12.3	13.4	14.1
2	Improvement in responsiveness	2.12	25.4	29.6	5.2	27.2	12.6
3	Facilitate Decision making	1.56	40.1	28.4	10.3	14.8	6.4
4	Improvement in Relationship with Trading Partners	1.27	49.5	28.6	12.6	4.6	4.7
5	Reduction in Cycle times	1.32	46.8	23.4	13.4	10.3	6.1
6	Reduced Delivery on incorrect Items	3.12	26.1	21.5	34.2	10.2	8.0

**Source: (Survey Data, 2018)**

Table 4.2 illustrates that the sampled respondents disagreed that: Reduction in process cost (73.6%;  $M=1.36$ ); Improvement in responsiveness (55%;  $M=2.12$ ); Facilitate Decision making (68.5%;  $M=1.56$ ); Improvement in relationship with trading partners (78.1%;  $M=1.27$ ); Reduction in Cycle times (70.2%;  $M=1.32$ ); Reduced Delivery on incorrect Items (47.6%;  $M=3.12$ )

#### **4.3.2 Stock – Out and Sustainable Supply Chain**

The third section of the study instrument sought to establish how aspects of stock-out have been practiced to enhance sustainable supply chain in Homa Bay County. In this regard, respondents were asked to state the level of their agreement with how various items presented in the questionnaire have enhanced sustainable supply chain as: 5- Strongly agree 4- Agree 3- undecided 2- Disagree 1- Strongly disagree. The Mean ( $M$ ) of the items as well as percentages obtained through descriptive statistics is presented in Table 4.3.

**Table 4.3: Stock Out and Sustainable Supply Chain**

	Mean	1	2	3	4	5
Stock is checked and updated	3.26	18.2	17.8	28.5	25.2	10.3
Reporting tools are used in stock validation	4.13	15.5	14.7	21.3	23.8	24.7
Large stock are maintained	2.29	32.1	24.6	15.3	15.8	12.2
Monitoring and oversight mechanism is necessary for stock outs and sustainable supply chain	4.21	12.4	10.2	0.3	32.6	44.5
Staff qualification is necessary for stock outs and sustainable supply chain	2.47	29.6	23.5	6.5	20.8	19.6

**Source: (Survey Data, 2018)**

Table 4.3 indicates that the sampled employees disagreed that sustainable supply chain is enhanced when stock is checked and updated (36%;  $M=3.26$ ), with 35.5% of them agreeing that it enhances sustainable supply chain in the county. However, 28.5% of the sampled respondents were undecided. The table also illustrates that 48.5% ( $M=4.13$ ) of the respondents agreed that reporting tools used in stock validation enhances sustainable supply change, with 30.2% of them disagreeing. Some 21.3% of the sampled respondents however remained undecided.

As to whether maintenance of large stock enhances sustainable supply chain, 56.7% ( $M=2.29$ ) of the sampled respondents disagreed while 28% of them agreed. The remaining 15.3% of the respondents were undecided. With regard to whether monitoring and oversight mechanism is necessary for stock outs and sustainable supply chain, 77.1% ( $M=4.21$ ) of the sampled respondents agreed while 22.6% of them disagreed that it enhances sustainable supply chain. The remaining 0.3% of the respondents were undecided. The table also presents results as to whether staff qualification is necessary for stock outs and sustainable supply chain, whereby 53.1%

( $M=2.47$ ) of the sampled respondents disagreed that it enhances sustainable supply chain while 40.4% agreed. Some 6.5% of the sampled respondents were however undecided.

Findings in this section seem to support Boon-itt and Pongpanarat (2011) who adapted the seven service SCM practices from Ellram et al. (2004) which are demand management, customer relationship management, supplier relationship management, capacity and resource management, service performance management, information and technology management, order process management. Based on detailed analysis, they found five main dimensions of SCM practices widely acknowledged by the researchers as well as suitable to be applied in healthcare industry. These five service SCM practices are information & technology management, customer relationship management, supplier relationship management, demand management, and capacity and resource management.

#### **4.3.3 Lead Time and Sustainable Supply Chain**

The fourth section of the questionnaire investigated how aspects of lead time have been practiced to enhance sustainable supply chain in Homa Bay County. In this regard, respondents were asked to state the level of their agreement with regard to how various items presented in the questionnaire have enhanced sustainable supply chain at Homa Bay County. A scale of 5- Strongly agree 4- Agree 3- undecided 2- Disagree 1- Strongly disagree was used to measure the responses. The mean ( $M$ ) of the items as well as percentages are presented in Table 4.5.

**Table 4.5: Lead Time and Sustainable Supply Chain**

	M	1	2	3	4	5
The County procurement department order cycle time is very short	1.23	36.9	30.8	5.9	10.4	6.0
There is strict adherence to order planning schedule	4.56	16.2	11.4	6.3	32.1	34
The County procurement department has a lower lead time relative to the industry norm	1.48	34.9	28.8	4.1	13.6	8.6
The County procurement department order scheduling techniques are very effective	3.17	25.2	23.9	31.8	10.2	8.9
The County procurement department experience a minimum number of faultless notes invoiced	1.35	38.2	26.8	4.8	19.6	10.6

**Source: (Survey Data, 2018)**

As illustrated in Table 4.5, aspects of lead time which respondents agreed with as enhancing sustainable supply chain was strict adherence to order planning schedule (66.1%;  $M=4.56$ ). In the meantime, most respondents disagreed that very short time of order cycle (67.7%;  $M=1.23$ ); lower lead time relative to industry norm (38.2%;  $M=1.35$ ); and experience of minimum number of faultless notes invoiced (65%;  $M=1.35$ ) enhance sustainable supply chain in the county. However, the respondents were undecided as to whether effectiveness of order scheduling technique (31.8%;  $M=3.17$ ) has enhanced sustainable supply chain at the county.

Results in Table 4.5 seem to contradict Namasenge and Biraori (2015) who, in a study that aimed at assessing the effect of supplier relationship on the effectiveness of supply chain management practices in Kenyan public sector: case of Ministry of Finance. They identified that lack of supplier relationship management strategies lowered the effectiveness of supply chain management functions. However, findings on adherence with order planning concurs with Okanda et al (2016) who investigated the influence of supply planning practice on the

performance of the unit of vaccines and immunizations in the Ministry of health, Kenya and found out that supply planning practices such as optimum inventory procurement, determination of health requirements of health facilities at every node, aggregate determination requirements and joint coordination with suppliers if adopted by the unit of vaccines and immunizations will increase the performance positively.

This also supports by the Agile supply theory which argues that supply chain members should show the willingness to create an environment in which information can flow freely in both directions in the chain for them to achieve a more agile supplier base.

#### **4.3.4 Inventory cost and sustainable supply chain**

The fifth (and the last) section of the questionnaire investigated how aspects of inventory cost have been practiced to enhance sustainable supply chain in Homa Bay County. In this regard, respondents were asked to state the level of their agreement with regard to how various items presented in the questionnaire (related to inventory cost) have enhanced sustainable supply chain at Homa Bay County. A scale of 5- Strongly agree 4- Agree 3- undecided 2- Disagree 1- Strongly disagree was used to measure the responses obtained from the sampled respondents. Results presented in Mean (*M*) of the items and percentages are presented in Table 4.7.

**Table 4.7: Inventory Cost and Sustainable Supply Chain**

	M	1	2	3	4	5
Application of Economic Order Quantity helps improve organizational supply chain performance by way of quantities required and when they are required.	4.65	13.9	6.5	19.6	31.4	28.6
Activity Based Costing (ABC) analysis application necessitates organizations to attain optimal supply chain performance.	2.74	37.4	28.1	4.2	19.3	11
Inventory planning helps organizations achieve optimal supply chain performance in simulation both financially and on service delivery.	1.84	41.3	29.2	3.1	13.5	12.9
Vendor management inventory system eases management’s work for inventory replenishment.	2.81	38.2	22.8	12.9	10.7	15.4
Lack of inventory management techniques has contributed to poor supply chain performance.	3.87	18.5	13.1	3.9	25.1	39.4

**Source: (Survey Data, 2018)**

Table 4.7 illustrates that aspects of inventory cost which the sampled employees agreed to have enhanced sustainable supply chain at Homa Bay County is the application of economic order quantity (60%;  $M=4.65$ ) and that lack of inventory management techniques has contributed to poor supply chain performance (64.5%;  $M=3.87$ ). The sampled respondents however disagreed that activity-based analysis (65.5%;  $M=2.74$ ); inventory planning (70.5%;  $M=1.84$ ) and vendor management inventory system (61%;  $M=2.81$ ) as practiced at the county has enhanced sustainable supply chain.

The findings in Table 4.7 indicate that the sampled employees seem not to be appreciative with the manner in which key inventory cost approaches like information management and analysis are practiced at the county. Probably this is one of the factors that have informed low attainment of sustainable supply chain (Table 4.2). Some previous researchers have come up with results that appreciate the impact of information management (a major determinant of inventory cost) on supply chain performance. In a study by Toyin (2012) in Nigerian among manufacturing

companies, it was revealed that information sharing, information quality, lean system and postponement has positive effect on supply chain management performance of Nigerian manufacturing companies. Another study by Ibrahim and Hamid (2012) among manufacturing companies in Sudan also established that Integration, information sharing, customer management and speed of responsiveness are supply chain management practices that can enhance sustainable supply chain.

Equally, Kimani (2013), in an investigation of the supply chain management challenges in Kenya petroleum industry also found out that four independent variables: information technology, supply chain design, collaboration issues and people issues are very critical to effective supply chain management in the petroleum sector. Customer relations, strategic partnerships, training and information sharing were also found to have positive impact on organization’s supply chain performance in a study by Mutuetandu and Iravo (2014) in Haco Industries Limited (Kenya).

### **4.3 Relationship between Demand Driven Approaches on Sustainable Supply Chain**

A descriptive analysis was first done to establish the extent to which demand driven approaches relate with sustainable supply chain in the organization. Table 4.9 presents the results of the descriptive analysis of quantitative data.

**Table 4.9: Descriptive Analyses of Sustainable Supply chain**

	N	Minimum	Maximum	Mean	Std. Deviation
Sustainable supply chain	99	1.00	5.00	2.1111	0.84096
Inventory Cost	99	1.00	5.00	3.3300	1.25696
Lead Time	99	1.00	5.00	3.6970	1.12215
Stock Out	99	2.00	5.00	2.2068	.99725

Valid N (listwise) 99

**Source: (Survey, 2018)**

Table 4.9 indicate that employees at Homa Bay County disagreed that sustainable supply chain has been attained ( $M=2$ ;  $SD=0.84096$ ). Similarly, the respondents also disagreed that stock out has affected sustainable supply chain ( $N=2.2068$ ;  $SD=0.99725$ ) at the county. However, the sampled employees agreed that lead time approaches ( $M=3.7$ ;  $SD=1.12$ ) as practiced at the county have affected sustainable supply chain. The respondents however remained undecided as to whether inventory cost approaches ( $M=3.33$ ;  $SD=1.26$ ) has affected sustainable supply chain at the county. It is therefore emerging from this finding that lead time approach as applied at the county is the main demand driven practice that tend to affect sustainable supply chain in the organization. In regard to sustainable supply chain having been achieved only to a small extent, it implies that there is a problem in lead time at Homa Bay County.

This finding seem to concur with Agile Theory, which asserts that lead time practices through information sharing and collaboration has the potential of assisting external suppliers to improve quality, delivery time and service performance. The theory further urges that this requires real time market feedback on actual customer requirements without making forecasts based upon past sales or shipments. Efficient Customer Response (ECR) is designed to integrate and rationalize product assortment, promotion, new product development and replenishment across the supply chain hence increasing emphasis on key areas such as EDI, cross- docking and continuous replenishment (Harrison & Van Hoek, 2008).

Lead time practices as a panacea to attainment of sustainable supply chain have been a focus of many researchers. Sukati *et al.* (2011), in a study done in Malaysia, found a positive relationship between lead time practices and the competitive advantage of firms. Okello and Were (2014) suggested that supply chain interventions need to be put in place to address issues such as negotiating contracts with external suppliers, involvement of E-procurement, creation of a close

relationship with suppliers and provision of continuous tracking over the physical movement of inventor. However, there was need to examine how demand driven approaches affect sustainable chain among firms. This study therefore examined the effect of demand driven approaches (inventory cost, lead time, and stock out) and sustainable supply chain in Homa Bay County.

#### 4.4 Effect of Demand Driven Approaches on Sustainable Supply Chain

Multiple regression analysis was performed to determine the effect of demand driven approaches (stock out, lead time, and inventory cost) on sustainable supply chain at the Homa Bay County.

The results are as presented in table 4.10.

**Table 4.10: Effect of Demand Driven Approaches on Sustainable Supply Chain**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics			Sig. F Change	
					R Square Change	F Change	df1		df2
1	.891 <sup>a</sup>	.794	.792	.60088	.794	360.831	3	281	.000

a. Predictors: (Constant), Stock out, Lead Time, Inventory Cost

Table 4.10 shows results from a multiple regression analysis where the independent variables were stock-out, lead time, and inventory cost, while the dependent variable was sustainable supply chain. It was established that the independent variable (stock out, lead time, as well as inventory cost) all together caused about 0.792 (79.2%) variations in the Supply chain sustainability. This F statistic =360.83; larger than 2 and significant at  $\alpha < 0.000$ ) at 95% confidence level implies that demand driven approached have a significant effect on sustainable supply chain. The analysis of the coefficients of demand driven approaches is presented in Table 4.11.

**Table 4.11: Analysis of the Coefficients of Demand Driven Approaches**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.218	.166		7.354	.000
	Stock out	-0.428	.102	-0.164	-4.179	.000
	Lead Time	1.188	.093	0.609	12.790	.000
	Inventory cost	0.601	.048	0.468	12.414	.000

a. Dependent Variable: Sustainable supply chain

After the multiple regression analysis, the model established was:

$$\text{Sustainable Supply Chain} = 1.218 - 0.164X_1 + 0.609X_2 + 0.468X_3 + \varepsilon$$

The multiple regression model established a beta constant of 1.218. This implies that a unit deviation in demand driven approached would lead to a 1.218 unit deviation in sustainable supply chain.

Stock-out has a significant effect on sustainable supply chain ( $\beta = -0.164$ ,  $\alpha = 0.000 < 0.05$ ). This statistically implies that a unit deviation in stock out would lead to -0.164-unit standard deviation in sustainable supply chain. Ideally if there was going to be an increase in stock out, this would lead to a decrease in sustainable supply chain. The hypothesis that stock out has no significant effect on sustainable supply chain was therefore rejected.

Lead time was established to be having a significant effect on Sustainable Supply Chain ( $\beta = 0.609$ ;  $\alpha = 0.01 < 0.05$ ). This implies that a unit deviation in lead time would lead to a 0.609 standard unit deviation in sustainable supply chain. Ideally this implies that an increase in lead time would translate lead to an enhance sustainable supply chain. The hypothesis that lead time has no significant effect on sustainable supply chain was therefore rejected.

Inventory cost has a significant effect on sustainable supply chain ( $\beta=0.468$ ,  $\alpha =0.000<0.05$ ). This implies that a unit deviation in inventory cost would lead to 0.468 standard unit deviation in sustainable supply chain. Practically this implies that an increase in inventory cost would lead to an increase in sustainable supply chain. The hypothesis that inventory cost has no significant effect on sustainable chain was therefore rejected.

These findings give credence to adoption of inadequate customer service expectations, demand uncertainty, and the flexibility of the supply chain (Ballou, 2004) by the organization. This finding seems to go against the demands of Agile theory which argues for responding quickly to short-term changes in demand or supply and ensure that the company handles external disruptions smoothly (Lee, 2004). Wilson (2004) urges for careful analysis to identify an economic order quantity (EOQ), being the quantity of an item that should be regularly ordered, so as to minimize total cost of ordering and holding cost.

## **CHAPTER FIVE: SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS**

This chapter presents a summary of the findings of the study, conclusions and recommendations. The researcher also suggests other areas for further studies based on the study findings.

### **5.1 Summary of the findings**

The general objective of this study was to examine the effect of demand driven approaches on sustainable supply chain in the County of Homa Bay. The demand driven approaches assessed were stock out, inventory cost, and lead time. The study found that the sampled employees disagreed that stock out as practiced at the county affect sustainable supply. However, inventory cost and lead time were found to affect sustainable supply chain to neither a small extent nor a large extent.

Similarly, all the demand driven approaches examined were found to have a positive relationship with sustainable supply chain. A high and positive significant relationship was found with all of the independent variables; lead time (.816\*\*), inventory cost (.811\*\*), and stock out (.508\*\*) all significant at the 0.01 level (2-tailed).

Stepwise multiple regression analysis to examine the effects of the potential predictors (demand driven approaches) on sustainable supply chain in Homa Bay County was also done. It revealed that stock out, lead time, as well as inventory cost all together predicted about 79% of the observed variance in sustainable supply chain, with a significant model fitting ( $F=360.83$ ;  $p<0.000$ ).

Model fitting predicted that the most important demand driven approach in determining sustainable supply chain was lead time (Beta=0.609;  $p<0.01$ ). It was also established that

inventory cost was significantly critical in predicting sustainable supply chain (Beta=0.468;  $p<0.01$ ). However, stock out (Beta= -.164;  $p<0.01$ ) as practiced at the county was found not to be significant in predicting sustainable supply chain.

## **5.2 Conclusion**

From the objectives, it is concluded that demand driven approaches have effect on sustainable supply chain in the county. On the results of the first objective, it is concluded that stock out approaches as practiced is not positively associated with sustainable supply chain in the county. Based on the results of the second objective, it is concluded that lead time has significant positively relationship with sustainable supply chain in the company. Similarly, concerning the third objective, inventory cost and sustainable supply chain was found to have strong positive relationships.

## **5.3 Recommendations for Improving Sustainable Supply Chain**

The study found out that stock out approaches as practiced at the county do not lead to sustainable supply chain. To aid in the attainment of sustainable supply chain, it is recommended that inventory management at the county be enhanced to adapt quickly to changes in the supply chain environment. To this end, appropriate sharing of information between internal users and suppliers need to be adopted.

Lead time approaches as practiced at the county was found to have affected sustainable supply chain. For further improvement in sustainable supply chain, it is recommended that the county need to adopt e procurement. This would enable Efficient Customer Response (ECR) designed to integrate and rationalize product assortment, promotion, new product development and replenishment across the supply chain.

Inventory cost, being the costs associated with keeping of stock or storage, is found to be significant in predicting sustainable supply chain at the county. To practice this kind of approach so that it enhances sustainable supply chain, it is recommended that information technology that employs virtual reality be adopted so that acquisition as well as placement costs can be appropriately minimized.

#### **5.4 Recommendation for Further Research**

The researcher recommends that further research be done in the following areas: The effects of stock-out costs approach on sustainable supply chain at the County Government of Kisumu.

The effect of lead time approaches on the performance of supply chain department at the County Government of Kisumu.

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## **APPENDICES**

### **APPENDIX I: LETTER OF INTRODUCTION**

Dear Respondent

My name is Michael Okeyo Suna. I am a student of Maseno University pursuing a Master of Supply Chain Management Degree. Am carrying out a research project titled: the effects of demand driven approaches on sustainable supply chain: A Case of Homa-Bay County Government. You have been selected to participate in this survey to obtain your perception and views on the same. Your honest response in answering the questions will assist in establishing the effects of demand driven approaches on sustainable supply chain: A Case of Homa-Bay County Government. The information obtained from this exercise shall only be used for the purpose of research and shall be treated with utmost confidentiality.

Thanking you in advance

---

**MICHAEL OKEYO SUNA**  
**Maseno University**

## APPENDIX II: QUESTIONNAIRE

Dear Respondent

Kindly fill this questionnaire. Information obtained from the study will be treated with utmost confidentiality and strictly used for academic purposes only. Your cooperation will be highly appreciated. Please answer the questions as objective as possible as your contributions will be highly valuable to this study. You are kindly requested not to write your name on the questionnaire.

Tick or write answers in full where applicable.

### **SECTION A: DEMOGRAPHIC DISTRIBUTION OF RESPONDENTS** (*please tick as appropriate*)

Respondents Profile:

1 Gender

- Male [ ]
- Female [ ]

2 Level of education

- Primary [ ]
- Secondary [ ]
- University [ ] Undergraduate [ ] Postgraduate [ ]
- Others (specify).....

3 Number of Years Worked In the Procurement Department

- 0- 1 year [ ]
- 1-5 years [ ]
- 6- 10 years [ ]
- Above 10 years [ ]

**SECTION B: Indicators of Sustainable Supply Chain**

Kindly rate the extent to which you agree with the following information regarding stock out and sustainable supply chain at the department.

Key: 5- Strongly agree 4- Agree 3- undecided 2- Disagree 1- Strongly disagree

		5	4	3	2	1
1	Reduction in process cost					
2	Improvement in responsiveness					
3	Facilitate Decision making					
4	Improvement in Relationship with Trading Partners					
5	Reduction in Cycle times					
6	Reduced Delivery on incorrect Items					

**SECTION C: Stock – Out on Supply Chain**

Kindly rate the extent to which you agree with the following information regarding stock out and sustainable supply chain at the department.

Key: 5- Strongly agree 4- Agree 3- undecided 2- Disagree 1- Strongly disagree

	5	4	3	2	1
Stock is checked and updated					
Reporting tools are used in stock validation					
Large stock are maintained					
Monitoring and oversight mechanism is necessary for stock outs and sustainable supply chain					
Staff qualification is necessary for stock outs and sustainable supply chain					

**SECTION D: Lead time on Supply Chain**

Kindly rate the extent to which you agree with the following information.

Key: 5- Strongly agree 4- Agree 3- undecided 2- Disagree 1- Strongly disagree

	5	4	3	2	1
The County procurement department order cycle time is very short					
There is strict adherence to order planning schedule					
The County procurement department has a lower lead time relative to the industry norm					
The County procurement department order scheduling techniques are very effective					
The County procurement department experience a minimum number of faultless notes invoiced					

**SECTION E: Inventory Cost on Supply Chain**

Kindly rate the extent to which you agree with the following information.

Key: 5- Strongly agree 4- Agree 3- undecided 2- Disagree 1- Strongly disagree

	5	4	3	2	1
Application of Economic Order Quantity helps improve organizational supply chain performance by way of quantities required and when they are required.					
Activity Based Costing (ABC) analysis application necessitates organizations to attain optimal supply chain performance.					
Inventory planning helps organizations achieve optimal supply chain performance in simulation both financially and on service delivery.					
Vendor management inventory system eases management’s work for inventory replenishment.					
Lack of inventory management techniques has contributed to poor supply chain performance.					

### APPENDIX III: WORK PLAN

ACTIVITY	DEC 2017	DEC 2017	DEC 2017	JAN 2018	JAN 2018	FEB 2018	MAR 2018	APR 2018	MAY 2018
Considering the best approach towards chosen study project.									
Stating study problem and determining research design.									
Defending the proposal									
Data collection piloting									
Data collection									
Writing and Presentation of Research findings(1 <sup>st</sup> draft)									
Writing the final draft									
Presenting of the Final draft									

**APPENDIX 1V: RESEARCH BUDGET**

ITEM	QUANTITY	UNIT COST Ksh	TOTAL-AMOUNT Ksh
<b>STATIONERY</b>			
-Photocopying	400 copies	3	1,200
-Foolscaps	2 rims	300	600
-Pencils	10 pieces	25	250
-Rubbers	10 pieces	20	200
-Printing	5 copies@100	10	5, 000
<b>TRAINING</b>	4 day	300x4 people	4, 800
ALLOWANCES (Research assistants)	4x7 days	3,000	84,000
DATA ANALYSIS	-	-	30,000
DISSEMINATION	-	-	-
Binding copies	5	60	300
<b>TOTAL</b>			126 350
<b>CONTIGENCY</b>			12, 635
<b>GRANT TOTAL</b>			138, 985

## APPENDIX V: MAP OF HOMA-BAY COUNTY



Source: (Google Maps, 2018)