

**INFLUENCE OF ELECTRONIC PROCUREMENT
PRACTICES ON SUPPLY CHAIN PERFORMANCE OF
SUGAR PROCESSING FIRMS IN KENYA**

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**Influence of Electronic Procurement Practices on Supply Chain
Performance of Sugar Processing Firms in Kenya**

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other University

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DEDICATION

I dedicate this thesis to my Wife Dina Bochaberi Ondari and my sons Gilbert and Marks who have continuously encouraged and supported me during my research period.

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LIST OF ABBREVIATIONS AND ACRONYMS

ADS	Automated Dispensing Systems
BI	Behavioural intention
CPOE	Computerized Physician Order Entry
CSM	Customer service management
DPS	Desktop purchasing systems
DW	Data warehouse
EDI	Electronic data interchange
EFT	Electronic fund transfer
EOP	Electronic order platform
EOQ	Economic order quantity
EP	Electronic procurement
EPC	Electronic purchasing consortia
ERP	Enterprise resource planning
GIS	Geographic information system
GPS	Global positioning system
HIS	Hospital Information Systems
HIS	Hospital Information Systems
ICT	Information & Communication Technology
IOS	Inter-organizational systems

IS	Information System
IT	Information Technology
KPI	Key Performance Indicator
KSD	Kenya Sugar Directorate
LAN	Local Area Networks
MRO	Maintenance Repair Operations
PIS	Pharmacy Information System
PO	Purchase Order
PPOA	Public Procurement Oversight Authority
RFID	Radio Frequency Identification
RFP	Request for Proposal
RFQ	Request for Quote
SCI	Supply Chain Interchange
SCM	Supply Chain Management
SRM	Supplier Relationship Management
TCO	Total Cost of Ownership
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
UDDS	Unit Dose Dispensing System
VAN	value Added Network
VMI	Vendor Managed Inventory

VR	Virtual Reality
WAN	Wide Area Network
WBDMS	Web-Based Document Management System

DEFINITION OF TERMS

E- Commerce practice: Trading in products or services using computer networks, such as the Internet. Electronic commerce draws on technologies such as mobile commerce, electronic funds transfer, supply chain management, Internet marketing, online transaction processing, electronic data interchange (EDI), inventory management systems, and automated data collection systems. Modern electronic commerce typically uses the World Wide Web for at least one part of the transaction's life cycle, although it may also use other technologies such as e-mail (Wagner & Sweeney, 2010).

E- Market practice: Electronic marketplace where business to business, buyers and sellers can trade efficiently. Electronic markets are more flexible, convenient and generally less costly than physical markets (Wagner & Sweeney, 2010).

Electronic material management: Electronic management and control of goods from acquisition to delivery at point of use by application of technologies such as Bar Coding, Radio Frequency Identification (RFID). Electronic warehouse management of stock levels, EOQ, MRPI & II and materials forecasting. Electronic devices are used for tracking the containers, packages, cartons or a truck carrying the goods on time bound dispatches to the customers. This type of technology could improve security, productivity, inventory control, and traceability as well as result in capital and other operational savings (Chandler, 2003).

Electronic order processing: The process of creating and approving purchasing requisition, placing purchase orders as well as receiving goods and services ordered, by using a software system based on internet technology (Kim, 2002).

Electronic Procurement practice: Business-to-business or business-to-consumer or business-to-government purchase and sale of goods, work, and services through the Internet as well as other information and networking systems, such as electronic data interchange and Enterprise Resource Planning. The e-procurement value chain consists of indent management, e-Informing, e-Tendering, e-Auctioning, vendor management, catalogue management, Purchase Order Integration, Order Status, Ship Notice, e-invoicing, e-payment, and contract management (Baily, 2008).

Electronic supplier management: Efficiently engage suppliers for sourcing events, analyze supplier responses, and make smart award decisions by use of modules such as Electronic bidding, Bid tabulation, supplier response scoring, efficient bid document distribution, RFI/RFP/RFQ templates, Sealed bidding, Reverse and forward auction and Audit trail of transactions, Contract Management by Proactively managing supplier engagements to mitigate risk and ensure compliance by use centralized supplier contract data, custom contract fields, contract document management, subcontract visibility, expiration alerts, invoicing and payment tracking and compliance reporting (Handfield & Nichols, 1999).

Electronic Tendering practice: An internet based process wherein the complete tendering process; from advertising to receiving and submitting tender-related information are done online. This enables firms to be more efficient as paper-based transactions are reduced or eliminated, facilitating for a more speedy exchange of information (Wagner & Sweeney, 2010).

E-procurement solution: A web-based client / server which automate the buying process and captures the necessary data from purchases for spend analysis. Different solutions can be used for indirect purchases, auctioning, sourcing, tendering and many other procurements related tasks (Wagner & Sweeney, 2010).

Procurement process: Purchasing of goods and services. However, it does not only comprise out of buying and paying but involves many other activities too, such as need clarification, purchase order generating etc. The goal of the procurement process is to satisfy the need of the company by acquiring goods and services from preferred suppliers for the most favorable price (SandaRenko, 2011).

Influence: The act or power of producing an effect without apparent exertion of force or direct exercise of command (Porter *et al*, 1999).

Supply chain: Network of all the individuals, organizations, resources, activities and technology involved in the creation and sale of a product, from the delivery of source materials from the supplier to the manufacturer, through to its eventual delivery to the end user (SandaRenko, 2011).

Supply chain management: Oversight of materials, information, and finances as they move in a process from supplier to manufacturer to wholesaler to retailer to consumer. The three main flows of the supply chain are the product flow, the information flow and the finances flow. SCM involves coordinating and integrating these flows both within and among companies (SandaRenko, 2011).

Supply chain performance: The extent of supply chain's activities in meeting end-customer requirements, including product availability, on-time delivery, and all the necessary inventory and capacity in the supply chain to deliver that performance in a responsive manner. (Presutti, 2003).

ABSTRACT

The purpose of this study was to establish the influence of E-procurement practices on supply chain performance of sugar processing firms in Kenya guided by four specific objectives, to establish the influence of electronic tendering practice on supply chain performance of sugar processing firms, to evaluate the influence of electronic order processing practice on supply chain performance of sugar processing firms, to assess the influence of electronic material management practice on supply chain performance of sugar processing firms and to find out the influence of electronic supplier management practice on supply chain performance of sugar processing firms. This study was based on are Electronic Market Hypothesis, Dynamic Capability Theory, Value Chain theory, Resource Based View Theory and Contingency Theory of Management. The study applied a mixed research design and the target population comprised all the 12 sugar manufacturing firms in Kenya with a population of 7,584 permanent employees. Stratified random sampling technique was applied to come up with a sample of 379 respondents drawn from management staff working in the departments of Procurement, Finance, Information communication Technology, Strategy, Factory, Agriculture, Marketing and Stores. Data was gathered by a self-administered drop and pick questionnaire, interviews and observation. Frequencies, percentages, mean scores was used to analyze the data with the help of Statistical Package for the Social Sciences. Pearson's correlation coefficient was used to determine the relationship between electronic procurement practices and Supply chain performance, multiple regression analysis was used to test the hypotheses and to determine the influence of electronic procurement practices on supply chain performance. The results of overall model reveals that electronic procurement practices had a positive influence on supply chain performance. With the inclusion of the values of the independent variables, supply chain performance is predicated to improve when e-tendering, e-order processing e-material management goes up and decrease when e-supplier management goes up. The study concludes that electronic procurement practices enhance supply chain performance. The study recommends that Sugar processing firms' management should ensure working

Websites, working internal and external mail and application of all E-procurement modules in order to reduce procurement process time, costs and errors. Sugar processing firms should also provide their suppliers with access credentials to company electronic procurement portal to increase buyer and supplier access to information to enhance electronic tendering, electronic order processing, electronic material management and electronic supplier management practices. Further the Government should institute policies concerning data safety to enhance the application of electronic procurement practices between the buyers and suppliers in terms of improved the electronic payment and application of electronic signature.

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

This section of the study introduces the following sub-sections in the following order, global perspective, and National perspective, statement of the problem, research objectives, research questions, research hypotheses, and significance of the study, justification of the study, scope and limitations of the study. It is the part of the study that lays down the foundations of the research problem on the influence E-procurement practices on supply chain performance of Sugar companies of sugar firms in Kenya.

1.1.1 Global perspective of electronic procurement practice

Electronic Procurement is an important business avenue for lowering purchasing price and enhancing process efficiency. The e-procurement value chain consists of indent management, e-Informing, e-Tendering, e-Auctioning, vendor management, catalogue management, Purchase Order Integration, Order Status, Ship Notice, e-invoicing, e-payment, and contract management. Effective supply chains are crucial for a firm to remain competitive in today's competitive economic environment. This effectiveness is driven by striving for proper synchronization and coordination of all activities across the entire supply chain network, ranging from end-customers to suppliers. As a result, once relegated functions such as procurement, a primary determinant for the organization's relationship with suppliers become important. Major changes are currently taking place within purchasing functions of manufacturing firms, (Chartered Institute of Purchasing and Supplies, 2011).

Electronic procurement is an ever-growing means of conducting business in many industries, around the world and is projected to reach \$3trillion in transaction this year, up from \$75 billion in 2002 (Venkatesh, 2010). The benefits of e-procurement

optimization are, increased efficiency, improved transparency, enhanced risk management, higher levels of integrity, greater and better access to government procurement for small and medium size enterprises, corruption avoidance and cost reductions as compared to traditional manual procurement. While there are various forms of e-Procurement that concentrate on one or many stages of the procurement process such as e-Tendering, e-Marketplace, e-Auction/Reverse Auction, and e-Catalogue/Purchasing, e-Procurement can be viewed more broadly as an end-to-end solution that integrates and streamlines many procurement processes throughout the organization. Although the term end-to-end e-Procurement is popular, industry and academic analysts indicate that this ideal model is rarely achieved and e-Procurement implementations generally involve a mixture of different models (Xu *et al.*, 2015).

Globally, e-procurement has gained popularity especially with the advent of technology. In United States of America for instance, rapid development of e-procurement was reported in early 2000 just before the recession. By the end of the same year, it was reported that all state functions were maintaining web presence in at least some stage of their procurement processes with some participating in online bidding (Reddick, 2004). In Malaysia, the government at some point issued a statement calling for all suppliers to use the e-procurement system (Yossuf *et al.*, 2011). Kaliannan *et al.* (2009) pointed out that Malaysian public sector are going through a rapid change especially as far as adoption of technology is concerned. Adoption of e-government and particularly e-procurement is inevitable for the government. A review conducted by Commonwealth of Australia indicates that the National governments of Italy, New Zealand, Scotland, New South Wales and Western Australia in 2005 revealed that these countries were already using e-procurement system for public procurement activities.

Globally purchasing is shifting its focus from daily procurement activities to long term, value adding purchasing and supply chain initiatives. At the same time, it is responding to the challenges and opportunities of electronic procurement by the utilization of the Internet to buy and sell products and services. The responsibilities of purchasing have

changed markedly in which over the last few decades, Purchasing focused heavily on the transactional elements of the procurement process. Purchasing was accepted as a support function that provides for the sourcing needs of other departments. The development of materials management and introduction of new manufacturing technologies has brought pre- and post-production flows closer together and thus manufacturing-purchasing interface strengthened, creating a need to align the buying cycle with production requirements, (Chartered Institute of Purchasing & Supplies, 2011).

E-procurement as enabled by ICT development is believed to make procurement more efficient and competitive in the changing manufacturing sector by adding value to processes and thus reduce costs. E-procurement uses different tools such as the phone, fax, email, web portal, ERP in procurement processes ranging from procurement planning, sourcing, requisitioning, tender/quotation sending and receiving, tender/quotation analysis, order processing and transmission to the suppliers, receiving goods and services, matching orders to invoices, electronic supplier payment, supplier evaluation and stock or material management. If the procurement processes are automated, it becomes efficient and effective thus value addition and reduction in order cycle, reduction in errors, standard procedures, and quick payments to suppliers, good internal and external customer relationship and improved supplier-buyers relationship will all results to improved quality of goods supplied and lead- time. The opportunity offered by digital technologies to make deep rationalization in purchase of supplies is becoming indispensable in competition between enterprises, considering positive effects in reducing the costs of the companies that have adopted the E-Procurement. As it has been confirmed by numerous case studies, automation of procedures for the purchase through e-procurement technology enables companies to achieve a reduction in costs (average 8-12%) of total purchases. So web-based models are playing a critical role within companies, especially in the generation of value of supply chain, (Centobelli & Cerchione, 2014).

With e-procurement the entire procurement process is handled online, so the company decided to make the purchases of various types, from raw materials to services, using B2B systems: these tools allow enterprises to reduce the cost and time of the procurement process, improve inventory and stocks management and, consequently, this is reflected in a decisive improvement in the management of all business processes. This is a necessary solution for large companies because it makes easier and more effective the management of the entire process of purchasing and supply network, and, on the other hand, for smaller companies that, in adopting e-procurement solutions, can become part of a global business with many opportunities for growth (Centobelli & Cerchione, 2014).

In the history of procurement, at one time, traditionally procurement was carried out by visiting a store and then following the procedures for placing an order or by looking through catalogues and making a phone call. The process of procurement traditionally involved manual procedures and in some point, handling procurement transactions went through slower systemic processes (Hawking *et al.*, 2004). The traditional procurement processes are the basis for the introduction of e-procurement to the system in stages advised by scholar of the field. Along with the emergence of internet, companies started turning their procurement activities towards internet since they found out that it would benefit them a great deal if all procurement processes are carried out correctly and properly. According to Shaw and Subramaniam (2002), e- Procurement played a vital role in business to business B2B e-commerce. Online based business to business e-commerce improves integration and inter-organizational coordination leading to cost savings in terms of transactions and great opportunities for competitive sourcing for organizations purchasing products and services. E-procurement is not only a strategic player in the value chain but also is a driver in extending supply chain networks (Hawking & Stein, 2004).

A good e-procurement system must have all elements that enable the buyers and sellers interact effectively including all supply chain activities from procurement planning information to supplier evaluation. Both buyers and sellers should have access to each other's information as and when required electronically for smooth functioning of E-procurement. The commonly adopted e-procurement practices used in procurement includes: E-Tendering, E-Request for Quotations, E-Auctions, E-Catalogues, and E-Invoicing (Vaidya, Sajeev & Callender, 2006). According to Roma and Mc Cue (2012), tools such as E-Notice, E-Auction, E-Catalogue, E-Dossier, E-Submission and E-Signatures are part and parcel of e-procurement. In this study, Enterprise Resource planning (ERP); an information system package that integrates information and processes across organizational functions (Brazel & Dang, 2008), E-maintenance; maintenance managed through computer over the internet (Levrat & Lund, 2003), E-tendering, tendering through online platforms (Garran, 2005) and E-Sourcing (online sourcing).

Over the last 40 years, while private and public sector organizations have been utilizing Information Technology (IT) systems to streamline and automate their purchasing and other processes, it is only in the past decade that e-Procurement systems have attracted attention. While there is debate about how recently e-Procurement has emerged. According to Dai and Kauffman (2001); Koorn, Smith and Mueller (2001), there is no doubt that the use of the Internet in e-Procurement provides several advantages over earlier inter-organizational tools. For example, Electronic Data Interchange has been providing automated purchasing transactions between buyers and their suppliers since it was launched in the 1960s.

Enterprise Resource Planning (ERP) followed in the 1970s, and then came the commercial use of the Internet in 1980s. It was only in the 1990s that the World Wide Web - the multimedia capability of the Internet became widely enabled and provided the essential resource for the automation of procurement (OGC, 2002). According to Koorn, Smith and Mueller (2001) there are three types of e-Procurement Systems: Buyer e-

Procurement Systems, Seller e-Procurement Systems and Online Intermediaries. While various e-Marketplaces have been launched based on the Enterprise Portal philosophy, the implementation of e-Procurement systems usually consists of two technologies within the Enterprise Application philosophy: a workflow system integrated with an e-Procurement application that supports requisition to payment; and the electronic catalogue that lists suppliers' items and prices over the Internet. Within these two philosophies, there are again two different approaches that the public sector agencies have used for implementation of e-Procurement: an end-to-end e-Procurement solution (the "big bang" approach), and the incremental implementation (Pan & Parkes, 2006).

Using Internet technology to buy goods and services from a number of known or unknown suppliers has improved the vendor process in Australia with much improvement being realized on the part of, e-informing: Gathering and distributing purchasing information both from and to internal and external parties using Internet technology, e-market sites: Expands on Web-based ERP to open up value chains. Buying communities can access preferred suppliers' products and services, add to shopping carts, create requisition, and seek approval, receipt purchase orders and process electronic invoices with integration to suppliers' supply chains and buyers' financial systems (Jessop, 2006).

As a major part of supply chain management (Leenders & Fearon, 1997; Monczka *et al.*, 1997), supply chains in procurement are traditionally supported by information technology. The first face started with the implementation of ERP or MRP systems in the 1980s, EDI connections with suppliers were established. For example, close partnerships have been forged with direct material suppliers through the automation of delivery schedules by linking a company's materials management system with supplier systems. The second face was since the mid-1990s companies have also been redesigning their relationships with business partners for indirect procurement. Direct procurement addresses all components and raw materials that are used in the manufacturing process of a finished product, such as sheet metal, semiconductors, and

petrochemicals (Lamming, 1995), whereas indirect procurement relates to products and services for maintenance, repair and operations (MRO) and focuses on products and services that are neither part of the end product nor resold directly (Zenz, 1994). Traditionally, ERP systems have been applied to products with high transaction volumes and direct implications for value-adding processes. As a consequence, we still find paper-prone and labor-intensive processes for indirect procurement which harbor large inefficiencies. The diffusion of e-Procurement systems in the late 1990s has created the potential for reorganizing the MRO supply chains. Compared to ERP, these systems were considerably less expensive and more flexible due to increased standardization on a technical level. A third phase of development in e-procurement has also been observable with the integration of electronic markets (e-Markets) in the supply chain since the end of the 1990s (Poirier & Bauer, 2000). These e-Markets evolved alongside the early system vendors like Ariba, Commerce One or SAP and support the outsourcing of operational procurement functions, offering tools for auctions and requests for quotations. However, following evolution of e-Markets has led to a substantial consolidation and many now focus on outsourced solutions for catalogs and auctions. To summarize, these three development stages form the basis for the term e-procurement in this paper. Dolmetsch *et al.* (2000), indicates e-procurement deals with the management of supply chains in the procurement of indirect goods which is based on Internet information systems and also e-Markets.

Integrated SCM has generated much interest dating back to the 1960s for example Forrester (1961) because actions taken by one member in the supply chain can influence the profitability of all other members. However, the lack of ICT hindered the implementation of a more “systems-oriented” approach. Inter-organizational systems (IOS) such as electronic data interchange (EDI) have been used since the 1970s to link one or more organizations to their suppliers or customers through private value-added networks. The advent of more advanced ICT, most notably the Internet, offers the potential to move beyond the limited EDI transaction sets to automate the data flows across the supply chain, thus making a contribution to a more multilateral information

exchange and the fostering of market-based exchanges in all transaction phases. Overall, e-business solutions in general are seeking to enhance supply chain effectiveness and efficiency through the automation of business processes (Wagner & Sweeney, 2010).

E-procurement systems have been in use for over two decades. Despite the maturity of the technology landscape, we estimate that companies use only about 25% of the available functionality of their solutions, in part due to lack of training or funds, but also because the solution may not be well aligned to procurement's evolving requirements. Notwithstanding these challenges, e-procurement offers clear benefits that can be used to build a business case for funding, increased utilization or investing in newer options. For example, a company with \$1 billion in indirect spend can save over \$3 million annually by using e-procurement to reduce non-compliant buying and order cycle times (Patrick *et al.*, 2014).

In Africa, the concept of e-procurement is just gaining popularity especially in the public sector. To deal with the problems of lack of accountability and transparency in procurement activities in the public sector, Most African countries have resorted to legal reforms and adoption of procurement. Tanzania for instance put into place e-procurement systems to allow e-sharing, e-advertisement, e-submission, e-evaluation, e-contacting, e-payment, e-communication and e-checking and monitoring to ensure all public procurement activities are conducted online (Sijaona, 2010).

1.1.2 National perspective of electronic procurement practice

In Kenya, there are some organizations that have successfully embraced the use of e-procurement technology. For instance Nation Media group through their digital platform commonly known as N-Soko enables their clients to purchase products online (Gitahi, 2011). Awino (2011) conducted an investigation of selected strategy variables on firm's performance. The study focused on supply chain management in large private manufacturing firms in Kenya. It was established that most of the SCM strategies of large manufacturing firms in Kenya are not owned by individual firms but also other

organizations within the SC that provide the required linkages towards the overall corporate performance of the manufacturing industry.

E-procurement applications allow employees to manage their own purchases, from the selection of the desired items from within a preprogrammed offering that matches the procurement office's parameters for cost and quality and supplier; to submitting requisitions; to tracking delivery status. This automation streamlines the procurement process and makes it more efficient, thereby making it faster and less costly. It also removes low-value tasks from the procurement department, which can then redirect its resources to higher-value activities such as negotiating contracts. Furthermore, the tools within many e-procurement applications allow procurement leaders to customize the procurement experience, determine which items will be available through e-procurement to which users. Many platforms also offer access over smart phones and tablets such as Mpesa where goods and services can be paid for electronically by use of pay bill or till number on the Safaricom platform in Kenya, (KNBS & CA, 2017).

Kenya, recognized as a developing-economy, e-government leader, has committed \$900 million for electronic services in the last six months alone, but officials say more education is needed to foster acceptance of the new e-tools for public services. A United Nations' 2014 survey identified Kenya and Morocco as e-government leaders in Africa, in terms of the number of citizens engaged in using e-services, though the report cited Tunisia and Mauritius as offering the most developed electronic services for citizens on the continent. South Korea, Australia and Singapore are the global leaders in e-government development, the report said, (UN, 2014).

The Kenyan government has launched an online system for submitting and evaluating procurement applications in a bid to become more efficient and eliminate corruption. Subsequently the goal is also to slash long queues and processes that take time. As part of the 'Integrated Financial Management Information System' (IFMIS) under the national treasury, the system is intended to give applicants clear instructions and

guidelines on how to apply for procurement from government. The system is expected to reduce government spending by having a level playing field for all, (PPOA, 2014).

With the advent of fiber optic technology, USAID partnered with Kenya to develop an E- Procurement system. Some issues were to be addressed concerning the technology in place to enable the Government to take full advantage of Internet commerce. The following first needed to be addressed: Identification: It is essential that parties in a transaction be able to identify themselves fully, as it is possible for a website to be spoofed. This requires all participants in the procurement process to be issued with digital certificates, which will verify their identity on-line through a hierarchy of Certification Authorities. Synchronization: There are occasions where timing is critical, such as an auction bid, and time stamping of transactions is important. Confidentiality: Orders and tender responses often contain company confidential information, and a procurement system needs to ensure that the necessary confidentiality measures are in place. Data Integrity: This requirement relates to the need to make sure that a document such as a tender specification or response is not modified in any way, or to identify when such a modification occurs. Bandwidth: Current Internet response in Kenya is still generally too slow, because of bandwidth restrictions. It is expected that this will improve as the main providers shift their focus to the B2B Internet commerce area. What can we expect the E-Procurement infrastructure to look like? (PPOA, 2014).

Public hospitals in Kenya are among the worst performing State institutions when it comes to technology access and use. New data indicates that in comparison to other government bodies, public hospitals have the lowest levels of internet access and are less likely to offer e-government services or have a website. 36.7 per cent of public hospitals do not have internet access while only 13.1 per cent of the surveyed institutions have a website. According to the study, 11.2 per cent of public hospitals have a mobile payment account, making it less convenient for Kenyans to settle their bills electronically when they receive treatment. The lack of tech savviness extends to procurement where only 20.3 per cent of the hospitals are using e-procurement platforms, the lowest rate among

public institutions. The medical institutions are also more vulnerable to cybercrime with statistics showing that 48.6 per cent of public hospitals have lost data due to virus attacks, (Kenya National Bureau of Statistics (KNBS) & Communications Authority (CA), 2017).

1.1.3 Sugar processing firms in Kenya

The sugar industry is a major contributor to the agricultural sector which is the mainstay of the economy and supports livelihoods of at least 25% of the Kenyan population. The subsector accounts for about 15% of the agricultural GDP, is the dominant employer and source of livelihoods for most households in Western Kenya comprising Nyanza, Rift Valley and Western Provinces. In 2008/2009, the industry produced close to 520,000 tons of sugar operating at 56 percent of the installed capacity. In such environment, the industry will have to enhance its competitiveness along the entire value chain and reduce production costs by at least 39% to be in line with EAC partner states and COMESA sugar producing countries (Kenya Sugar Industry Strategic Plan, 2010-2014).

The industry has twelve (eleven operational) sugar factories namely: Chemelil Sugar Factory; Kibos Sugar and Allied Factories; Muhoroni Sugar Factory (in receivership); Miwani sugar factory (not operational), Mumias Sugar Factory; Nzoia Sugar Factory; Soin Sugar Factory; South Nyanza Sugar Factory; Sukari Industries Limited; Transmara Sugar Factory; West Kenya Sugar Factory and Butali Sugar Factory. Kwale International Sugar Company is yet to be commissioned (Kenya National Assembly, 2015).

Kenyan sugar factories are high cost producers of sugar. This has reduced competitiveness of the industry. The cost of sugar production in Kenya is currently estimated at USD 870 per MT which is twice the cost of production in other COMESA competing countries. This is very high compared to Zimbabwe (USD 300), Malawi (USD 350), Swaziland (USD340), Sudan (USD 340), and Zambia (USD 400), (Kenya National Assembly, 2015). Beginning 2001, the Kenya government has renegotiated

COMESA safeguards on five different occasions to give the industry sufficient time to improve its productivity and efficiency. In recent case, Kenya was allowed one year extension effective March 1st 2015 to improve efficiency and productivity of its sugar industry (Kenya National Assembly, 2015).

Sugar industry in Kenya is currently faced with grave problems that include high costs of inputs and stiff competition from low cost manufacturers. Based on supply and demand for the products, it's clear that significant changes and investigation on increasing the performance and competitiveness of this segment is still a key national priority. Kenya is presently enjoying a temporarily protection through a COMESA safeguard that was granted to allow Kenya build its economic advantage until 2018 when the safeguard measure will be lifted. Kenya Sugar segment is destined to undertake key reforms in several aspects to build competitiveness and introduce effective governance in the commodity supply chain, (KSD, 2017).

1.2 Statement of the problem

In Kenya, manual systems have been a source of major inefficiencies in the regulation and operations of the procurement function. Therefore there is need to adopt ICT in order to ensure proper functioning of the procurement system. To meet today's operating challenges, technical institutions are turning to ICT to improve the services for suppliers and other customers in order to lower operating costs and improving performance. Online communication, online tender advertising and computerized tendering process influences performance of the procurement function. IT offers smoother and faster process flow, efficient distribution of information, decentralization of tasks and decisions, increased transparency and better control (Mburu & Njeru, 2014).

The average cost of producing one ton of cane in Kenya is USD 22.5 while that of the regions is as low as USD 13 per ton. The average cost of producing a ton of sugar in Kenya is USD 870 (or USD 700 exclusive of finance charges) compared to USD 350 in Malawi and USD 400 in Zambia, Swaziland and Egypt and in USD 450 in Sudan,

(Kenya National Assembly,2015). Sugar production in Kenya reduced from 580 metric tons in 2015/2016 to 520 metric tons in 2016/2017 (Global Agricultural Information Network, 2017).

The high cost of production per ton of sugar and the reduction in sugar output can be associated to the application of manual procurement systems by sugar processing firms in Kenya. The application of manual procurement processes to procure goods, services or works is a challenge in acquiring such goods, services or works at the right time, price, place, quantity and quality for the use of all the departments in an organization. Because of lack of efficiency and effectiveness of procurement process, the government of Kenya continues to lose millions of shillings through fraud in procurement activities in the government mainstream, (GAIN, 2017). Parastatals operations have become inefficient and non-profitable, partly due to multiplicity of objectives, stifled private sector initiatives and failing of joint ventures requiring the government to shoulder major procurement burdens (Bilali & Bwisa, 2015).

Despite e-procurement gaining popularity due to globalization, technological changes and advancement, there are businesses that still carry out some activities manually. According to PPOA (2013), in public sector, most procurement processes were still manual and internet is only fully used in web browsing and in e-mails.

With the need to integrate key functions such as procurement and accounting and to streamline and enhance transparency in management of public funds as well as to provide a framework for standardized reporting, the government has adopted the policy requiring all government procuring entities to use the Integrated Financial Management Information System (IFMIS). According to Commission of Revenue Authority (2013), in the 2013/2014 financial year a total of 210 billion Kenya shillings was disbursed to the county governments to facilitate their operations. This resulted in a remarkable achievement when the government ministries reported a 42.7% drop in their

procurement operating cost amounting to Ksh629 million down from KSh1.64billion in the previous year (GoK, 2014).

Waniani, Namusonge and Lagat (2016) found out that technological infrastructure available in Nzoia Sugar Company was considered to be adequate. A large portion (66.9%) of the respondents agreed that the company has adequate technological infrastructure to support e-procurement. This included hardware and software, the internet and technical expertise. 33.1% of the respondents disagreed that the technological infrastructure was not adequate to support e-procurement. They attributed this to unreliable internet and lack of scanners. The respondents agreed that Internet connection; poor network coverage and system failures are the challenges facing the Nzoia Sugar Company in e-procurement implementation and company have acquired the required ICT infrastructure to support e-procurement in advance. They disagreed on internal electronic communication on issues related to procurement using technologies other than email such as instant messaging; video conferencing and they strongly disagreed on permitting the suppliers to directly access the internal systems such as Enterprise Resource Planning Systems and Technological integration of the e-procurement system with other internal systems. The respondents considered the security of data and information as the most important element in procurement. Technological infrastructure accounted for 11.38% of e-procurement implementation in Nzoia Sugar Company.

To understand the concept of e-procurement and the associated benefits, a number of studies have been done. For instance, studies have been done on implementation of e-procurement, challenges of implementation of e-procurement and benefits of e-procurement. Studies have also related e-procurement with other variables like operational and overall organizational performance. Studies carried out in Kenya focused on other areas of procurement and logistics. Muhia and Afande (2015) studied the role of adoption of e-procurement strategy on procurement performance of state corporations in Kenya by focusing on Kenya Revenue Authority. Kioko and Mwangangi

(2017) studied the influence of e-procurement on performance of parastatals in Kenya. Fozia, Namusonge and Shaelle (2016) studied the effect of electronic supplier management practices on the implementation of preference regulations on state corporations in Kenya. Nafula and Namusonge (2017) studied the effect of e-procurement practices on efficiency frontier of Kakamega County Government. Barasa, Namusonge and Okwaro (2017) studied the effects of E-procurement on the organizational Performance of County Governments in Kenya: A Case study of Bungoma County Government. A few studies have related e-procurement with Supply chain performance while none had studied such relationship in the sugar manufacturing sector.

This study is driven by the fact that the history of the Kenya sugar industry has been revolving around procurement, production and distribution inefficiencies, inability to compete with imported sugar and perennial losses. It is however not clear that the past studies on e-Procurement have focused on the influence of e-Procurement on Supply Chain performance particularly in sugar processing firms. The aim of this study is therefore to fill this knowledge gap by finding out the influence of electronic tendering, effect of electronic order processing practice, electronic material management and electronic supplier management practice, with an aim to recommend how E-procurement can improve procurement of goods and services in the manufacturing sector.

1.3 Research objectives

1.3.1 General objective

The general objective of the study was to establish the influence of electronic procurement practices on supply chain performance of sugar processing firms in Kenya

The study considered the general objective, four specific objectives, four research questions and four Research hypotheses.

1.3.2 Specific objectives

Thy study is based on specific objectives;

1. To determine the influence of electronic tendering practice on supply chain performance of sugar processing firms in Kenya.
2. To evaluate the influence of electronic order processing practice on supply chain performance of sugar processing firms in Kenya.
3. To assess the influence of electronic material management practice on supply chain performance of sugar processing firms in Kenya.
4. To find out the influence of electronic supplier management practice on supply chain performance of sugar processing firms in Kenya.

1.4 Research hypotheses

The study tested the following hypotheses;

H₀₁: Electronic tendering practice has no significant influence on supply chain performance of sugar processing firms in Kenya.

H₀₂: Electronic order processing practice has no significant influence on supply chain performance of sugar processing firms in Kenya.

H₀₃: Electronic material management practice has no significant influence on supply chain performance of sugar processing firms in Kenya.

H₀₄: Electronic supplier management practice has no significant influence on supply chain performance of sugar processing firms in Kenya.

1.5 Significance of the study

The findings of this study will be beneficial to researchers, procurement professionals, academicians, policy makers, vendors and investors.

1.5.1 Researchers

This study will assist researchers in the area of e-procurement as it will serve as a point of reference for the researchers as they conduct studies in this and other related topics. Procurement being an area that is attracting a lot of professional, academic and scholarly attention, this project can be used as a reference to promote the general academic and scholarly input to the understanding of this body of knowledge. The study will also assist in confirming the theoretical assumptions on the impact of e-procurement on supply chain performance.

1.5.2 Policy makers

The findings of the study will equally enable policy makers to devise e-procurement policies that are based on empirical evidence.

1.5.3 Sugar processing firms

The findings of this study will also assist the large scale manufacturing firms in Kenya to understand the factors influencing the success of e-procurement initiatives as well as the various challenges that they face in implementing e-procurement technologies within their organizations.

1.5.4 Supply chain professionals

The study will be helpful in addressing the factors identified so as to increase the usage of e-procurement in enhancing supply chain performance among the population identified. The government will find the information useful in diagnosing the problems

affecting the financial sector and come up with policies that will support electronic procurement adoption to enhance supply chain performance.

1.5.5 Investors

Investors in the financial sector may use the information from this study to make critical decisions regarding electronic procurement for cost minimization and profit maximization. They will use the findings as a benchmark for best practice in procurement practices.

1.5.6 Vendors

E-procurement websites allow qualified and registered vendors to look for buyers and other registered users to look for both buyers and sellers of goods and services. Buyers or sellers can initiate transactions or can be initiated completed by use of E-procurement websites. Ongoing purchases may qualify customers for volume discounts or special offers.

1.6 Scope of the study

The study will cover all the 12 comprising of 5 public and 7 private owned sugar Factories. The public Companies include Nzoia, Chemilil, Muholoni, Sony and Miwani. The private Companies are Mumias, West Kenya, Butali, Soin, Sukari mills, Kibos and Transmara Sugar factories. They span western Kenya, Nyanza and Rift Valley regions. This was a survey of all sugar factories registered by Kenya Sugar Board as at 2014, (KSD, 2014). Target population of the study comprised of 7,584 permanent employees and stratified random sampling technique was applied to come up with a sample of 379 respondents. The research was conducted for 2 years starting September 2015. The study focuses specifically on sugar 12 companies in Kenya because the scope created convenience in data gathering and therefore posing an ideal context of the study. The study singles out management as most applicable in seeking primary data on E-

procurement practices as opposed to the entire staff population to avoid collection of data from those not directly involved in E-procurement application and hence may not be privy to the required information for the study. Choices of e-procurement practices were confined to Electronic tendering, electronic order processing, electronic material management and electronic supplier management practices which were to be the most relevant in the study context covering the whole supply chain. The scope was chosen because sugar manufacturing firms operate continuously in their production processes thus an assumption that e- procurement practices are more pronounced to support their continuous running.

1.7 Limitations of the study

This study adopted a cross-sectional survey and this was one of the main limitation of the study since the researcher could not corroborate cross-sectional findings and examine performance prior to and after implementation of E-procurement practices at different time periods in order to provide insights into the refinement of the pertinent items. A longitudinal study examining the development of performance for longer period of time should be considered in future research.

The challenges experienced included some of the respondents not filling or completing the questionnaires. Some questions were misunderstood and therefore inadequate responses to questionnaires. Some of the questionnaires were not completed due to unexpected occurrences like people going on leave before completing. This was mitigated through constant reminder to the respondents during the period the questionnaires were administered to them.

The study also was based on a self-reported questionnaire and therefore there was a possibility of respondents answering questions in a way that is perceived to be desirable to them than the actual reality. The study could not include other key stakeholders in sugar industry like suppliers, customers, civil society and the ministry of Finance who

also have interest in the sector and their opinions could have assisted in the making of final recommendations.

The organizational confidential policy restricted most of the respondents from answering some of the questionnaires. It was considered to be against the organization confidentiality policy to expose the organization confidential matters. This was solved by assuring the respondent of utmost confidentiality and disclosing the academic purpose and intention of the study. The introduction letter obtained from the university and the Ministry to the organizations management to avoid suspicion and enabled most institutions to disclose much of the information sought by the study.

The study was not able to get any respondent from Miwani sugar because at the time of the study, the factory was closed down. Finally, the study was on sugar companies in Kenya and single sector may not be generalized to other sectors. Future research should consider multiple industries or sectors to increase the understanding of the contributions of Supply chain management practice on performance.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter discusses the literature review of the study, theories applicable, empirical review, conceptual framework, critique, research gaps and summary. Literature was reviewed from journals, books, working papers, reports and periodicals. Literature review helped to orient the researcher on existing theoretical issues and previous studies on E-procurement on different organizations.

2.2 Theoretical framework

Researchers are struggling to find out the relationship between IT utilization and its impact on performance of the organizations and individuals, (Chau, 1996). This study briefly introduced some of the theories applied to SCM which are borrowed from fields such as accounting, management, economics, sociology and engineering. The popular theoretical models in the field of social psychology that this study is based on are Electronic Market Hypothesis, Dynamic Capability Theory, Value Chain theory, Resource Based View Theory and Contingency Theory of Management.

2.2.1 Electronic Market Hypothesis

The efficient-market hypothesis emerged as a prominent theory in the mid-1960s but gained prominence when Paul Samuelson had begun to circulate Bachelier's work among economists (Fama & Eugene, 1965). In 1964 Bachelier's dissertation along with the empirical studies mentioned above were published in an anthology edited by Paul Cootner, (Cootner & Paul, 1964). In 1965 Eugene Fama published his dissertation arguing for the random walk hypothesis (Fama & Eugene, 1965), and Samuelson published a proof for a version of the efficient-market hypothesis (Samuelson, 1965).

Traditional economics describe the two basic mechanisms for coordinating the flow of products/services between buyers - suppliers; markets and hierarchies. In markets, buyers can search goods from many suppliers and market forces of supply and demand define the design, price, quality and delivery schedule of the items. As buyers must search all suppliers, they incur transaction and co-ordination costs. So, if the coordination and transaction costs are large, hierarchical coordination between buyers and suppliers are preferable. In their EMH, Malone *et al.* (1987) stated that: “by reducing costs of coordination and transactions, IT will lead to an overall shift toward proportionately more use of e-markets – rather than hierarchies”.

However, Malone *et al.* (1987) went further arguing that inter-organizational electronic networks can improve coordination between firms in two contrasting ways. ICT have an electronic brokerage and market effect when electronic networks are used to reduce search costs. By connecting different buyers and sellers through a shared network and providing some searching tools, electronic networks help buyers to quickly, conveniently and inexpensively evaluate the offerings of various suppliers and seamlessly and efficiently finalize and conduct any transactions. However, when ICT are used to more tightly couple buyers and suppliers, an electronic integration effect takes place which implies a crucial change in their relationship.

However, in the information era, more importance is given to knowledge-based ICT advantages/resources. So, although traditional transaction economics have mostly focused on tangible ICT assets, some studies have begun to recognize the importance of intangible assets reflecting knowledge and expertise. Thus, previous studies on the ICT impact on market structure focused on the role of physical asset specificity due to the presence of dedicated ICT (Venkatraman & Zaheer, 1990; Barret & Konsynsky, 1982), on the role of systems in creating process specificity (Zaheer & Venkatraman, 1994), but recent research is also investigating the impact of information acquisition, dissemination and exploitation. Christiaanse and Venkatraman (1998) proposed the concept of expertise exploitation to further understand ICT’s role in vertical electronic channels.

Expertise exploitation refers to the capabilities a firm develops to monitor and influence downstream channel members' behaviour by the utilization of knowledge assets in exchange relationships. It also refers to learning effects related with the use information as an asset by exploiting critical information gathered by distribution members. Their study revealed that firms developing expertise exploitation through electronic channels create hierarchical relationships with their partners. Firms exploiting ICT generated information also gain greater strategic benefits in the development of yield management (Sigala *et al.*, 2001), e-marketing strategies (Sigala, 2001) and the materialization of ICT benefits (Sigala, 2002).

The EMH is built on the rock-solid foundation of transactions costs analysis, which has proved to be a very accurate predictor of firm behavior. Electronic Market Hypothesis (EMH) predicts that by reducing coordination cost, Information technology will shift the organization from hierarchical to market based form of economic activity (Malone, Yates and Benjamin, 1987). EMH predicts IT transformation will occur in stages from hierarchies to biased electronic market and from biased markets to unbiased electronic market. This transformation has taken place over time and organizations have shifted from brick markets to mortar markets or internet based procurement and Business-to-Business (B2B) electronic markets (Granados *at el*, 2006). Internet based procurement are open systems that allows firms to transact with suppliers and customers in virtual markets without investments in dedicated systems. According to a report, the total value of goods and services sold and bought via B2B electronic markets had reached \$2.7 trillion by year 2004, representing some 27% of the overall B2B market and at least 3% of global sales transactions (Gartner Group, 2006). This growth was slated to occur in the context of global market for B2B transactions worth \$953 billion, growing to about \$7.29 trillion by 2004 (Gartner Group, 2006).

One of the driving forces behind the emergence of e-procurement has been the development of new technologies for electronic data transfer. The most widely recognized method is that of Electronic Data Interchange. EDI is linked to the

purchasing and distribution functions with the use of the appropriate software that supports designing activities and controls production processes (Moore, 1998). EDI involves the computer-to-computer exchange of business documents in a standard, format that can be processed by a machine between and among inter-organizational trading partners. According to McIntosh *et al.* (2001) internet EDI enables the automation of the whole supply chain (i.e. the synchronization of the demand, supply, and production from the raw material supplier, to the organization and up to the ultimate product consumer) and extends the boundaries of Intranets so that they transform themselves into Extranets.

From the theoretical framework, Electronic tendering practice is explained by the Electronic Market hypothesis. Traditional economics describe the two basic mechanisms for coordinating the flow of products/services between buyers - suppliers; markets and hierarchies. Malone *et al.* (1987) argued that inter-organizational electronic networks can improve coordination between firms in two contrasting ways. ICT have an electronic brokerage and market effect when electronic networks are used to reduce search costs. By connecting different buyers and sellers through a shared network and providing some searching tools, electronic networks help buyers to quickly, conveniently and inexpensively evaluate the offerings of various suppliers and seamlessly and efficiently finalize and conduct any transactions.

This theory is relevant to this study in that when companies adopt E-procurement, coordination costs reduce as all the information is easily and freely shared between the buyers and sellers. A company is able to access more markets in the e-markets, use e-auction, e-commerce and all this will lead to less transaction costs and reduced lead time and no stock outs.

2.2.2 Dynamic Capability Theory

The aspect of dynamic capability was first coined by David Teece, Gary Pisano and Amy Shuen (Chien & Tsai, 2012). The theory describes an organization's ability to deliberately organize its resources in an effort to improve performance. According to Chien and Tsai (2012), dynamic capability is the capability of an organization to purposefully adapt an organization's resource base. An organization should be able to react adequately and timely to external changes. This requires the adoption of different strategies that will harness multiple capabilities of the organization and put them into use. This will give the company the ability to integrate, develop, and leverage on the environmental competitive advantage. Indeed, the current business world is very dynamic. Changes ranging from organizational structures, culture, marketing and customer's tastes and preferences are taking a different path. As such, organizations should have the ability to respond to these changes in the most effective manner. The dynamic capability theory asserts that only those organizations able to achieve this will actually be able to break even in this competitive world (Chien & Tsai, 2012).

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.

This theory is related to e-order processing to cope and change with dynamic markets to be able to provide goods and services to sugar processing to use in their production process in highly dynamic and competitive environment. Changes in marketing strategy, organizational structure as well as tastes and preferences among customers is prevalent and as to such sugar firms should be able to process customers' orders quickly. Evidently, e-procurement integrates the in-house and external procurement components to address dynamics in the way organizations achieve operational excellence by reducing cost and saving on time used to procure goods (Mwenga, 2016). Additionally, e-procurement is IT based, and will almost always be up to date with the latest trends in the market.

From the theoretical framework, Electronic order processing practice is explained by the Dynamic Capability Theory. 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.

2.2.3 Value Chain theory

The theory of value chain was founded by Michael Porter in 1985 (Christopher, 1992). To better understand the activities through which a firm develops a competitive advantage and creates shareholder value, it is useful to separate the business system into a series of value-generating activities referred to as the value chain. In his 1985 book *Competitive Advantage*, Michael Porter introduced a generic value chain model that comprises a sequence of activities found to be common to a wide range of firms (Christopher, 1992).

A value chain disaggregates a firm into its strategically relevant activities in order to understand the behavior of costs and the existing and potential source of differentiation. Porter's value chain consists of a set of activities that are performed to design, produce and market, deliver and support its product. Porter distinguishes between primary activities covering inbound logistics, operations, outbound logistics, marketing and sales, service in the core value chain creating directly value and support activities including procurement, technology development, human resource management and firm

infrastructure. Porter formulates the general strategies for the value chain of cost leadership and differentiation to reach competitive advantage (Porter, 1985). These cross-value chain strategies established a principle that competitive advantage can be reached only by managing the entire value chain as a whole including all involved functions. Porter's value chain is one basis for the development of the supply chain. The term supply chain was created by consultant Keith Oliver in 1982. Compared to the company-internal focus of Porter's value chain, the supply chain extends the scope towards intra-company material and information flows from raw materials to the end consumer. A supply chain is a network of organizations that are involved through upstream and downstream linkages in different processes and activities that product value in the form of products and services in the hand of the ultimate consumer (Christopher, 1992). Because technology is employed to some degree in every value creating activity, changes in technology can impact competitive advantage by incrementally changing the activities themselves or by making possible new configurations of the value chain (Simichi-Levi, 2000).

In an increasingly complex world of globalized trade with extended lead times and greater risk, the integration in the supply chain will require supporting information systems and technology. The growth of the internet and technologies which enable real-time information sharing such as inter-connected ERP systems, web-based EDI, electronic portals and online order processing systems, can potentially support the building of closer links with customers, suppliers and third-party vendors such as logistics service providers. In practice however, the progress towards such supply chain integration between firms has often been stalled by factors such as rival cultures, information technology deficiencies, lack of process alignment and other organizational legacies (Akkermans *et al.*, 1999). Hence whilst this new technology offers much promise, examples of its success in transforming supply chain practice are still relatively few in number. Simichi-Levi (2000) found that companies implementing efficient production, total quality management, and reengineering strategies, will decrease costs while increasing their flexibility and quality of service. Each of these achievements,

when implemented successfully, results in a competitive advantage. Ultimately, the result of these efforts has allowed managers to recognize that further improvements may be realized through supply chain management efficiencies (Poirier, 1999). To evaluate the role of information technology in supply chain management initiatives, Kumar and Dissel (1996) discuss the framework relating to the formation of cooperative alliances. They assert that organizations that normally engage in these alliances are driven by environmental forces in order to achieve a certain goal. Effective supply chain management requires information to be shared and transmitted beyond the boundaries of the organization. These information systems, expanding the availability and transfer of information between various trading partners, are called inter-organizational information systems (IOIS). The virtual vertical integration created by IOIS can then be used to reduce supply chain uncertainty (Kumar, 1996). Such electronic cooperation is called information partnership and focuses its attention on creating strategic value through increasing operational efficiencies (Lee, 1992). The time value and volume of information that is shared between trading partners is represented by various degrees. For example, at the highest level of an information partnership, the IOIS is fully disclosed to network participants (Lee, 1992).

From the theoretical framework, Electronic material management practice is explained by the Value Chain Theory. Compared to the company-internal focus of Porter's value chain, the supply chain extends the scope towards intra-company material and information flows from raw materials to the end consumer. Porter's value chain consists of a set of activities that are performed to design, produce and market, deliver and support its product. Porter distinguishes between primary activities covering inbound logistics, operations, outbound logistics, marketing and sales, service in the core value chain creating directly value and support activities including procurement, technology development, human resource management and firm infrastructure. Porter formulates the general strategies for the value chain of cost leadership and differentiation to reach competitive advantage (Porter, 1985).

For this study the Value chain theory implies that those firms that adopt E-procurement are able to gain from the growth of the internet and technologies which enable real-time information sharing such as inter-connected ERP systems, web-based EDI, electronic portals between buyers and suppliers and online order processing systems which supports the building of closer links with customers, suppliers and third-party vendors such as logistics service providers.

2.2.4 Resource Based View Theory

The Resource Based View (RBV) theory was developed by Barney and Wernerfelt in 1930s in their analysis of heterogeneous firms which introduced the idea of resource position barriers being roughly analogous to entry barriers (Lynch *et al.*, 2000). It asserts that the resources of an organization are key to ensuring that it performs well. These resources are what determines if an organization has an added advantage over the rest. As a result, exploiting surrounding opportunities using available resources in a new way is more efficient rather than acquiring new skills for each different opportunity. According to the RBV theory, resources can be classified into organizational capital resources, physical capital resources and human capital resources. Allocating them efficiently helps an organization to achieve greater performance (Lynch *et al.*, 2000).

The RBV can be used as a basis for the development of supply chain strategy taxonomy (McKoneSweet & Lee, 2009). SCI requires a collaborative effort between a manufacturer and its suppliers and customers (Flynn *et al.*, 2010). If a firm is completely vertically integrated, most of the prominent materials supplies are provided by its internal units. In fact, firms also acquire external resources from external parties such as suppliers and customers. Dyer and Singh (1998) highlighted that valuable resources are often provided by supply chain partners and argued that structuring the interorganisational resources is more critical to achieve outstanding performance than a firm's own constrained resource base. Specifically, suppliers play an integral role in supplying essential resources to the focal firm as well as in the firm's implementation

strategies. Accordingly, the external resources must be effectively managed and integrated with the internal resources of the firm in order to achieve superior performance (Hitt, 2011). The heterogeneous partner-specific resources therefore constitute the potential for a competitive advantage. Moreover, the sustainability of the competitive advantage can be achieved when the resources are immobile and difficult to imitate or appropriate (Morris *et al.*, 2005). The RBV suggests that holding valuable, rare, inimitable and non-substitutable resources is important, however, it is more important for a firm to leverage and bundle its internal and external resources in order to create its competitive advantage.

Integration is a process of interaction and collaboration in which companies in a supply chain work together in a cooperative manner to achieve mutually acceptable outcomes (Pagell, 2004). Kim and Narasimhan (2002) asserts that supply chain integration links an organization with its customers, suppliers and other channel members by integrating their relationships, activities functions, processes and locations. According to Lambert (2004), successful supply chain management requires cross-functional integration of key business processes within the company and across the network of companies that consist of the supply chain. Organizations must integrate their operations with trading partners in order to sustain competitive advantage for the whole supply chain (Lambert & Cooper, 2000).

Power (2005) asserts that integration involves the cooperation, collaboration, information sharing, trust, partnerships, shared technology and a fundamental shift away from managing individual functional processes to managing integrated chains of processes. Kwon and Suh (2004) consider supply chain integration to be a strategic tool that aims to reduce costs and thus increase customer and shareholder value. Supply chain integration is a good approach for improving business performance in a highly competitive market (Narasimhan, Jayaram, & Carter, 2001). Frohlich and Westbrook (2001) assert that the highest levels of integration with both suppliers and customers have the highest correlation with high levels of an organization's performance.

The major challenge in supply chain integration is to coordinate activities across the supply chain so that the enterprise can improve performance by reducing costs, increasing service levels, reducing the bullwhip effect, better utilization of resources and effectively responding to changes in the market place (Simchi-Levi *et al.*, 2009). Chopra and Meindl (2015) argues that supply chain coordination occurs when all the different stages of supply chain work toward the objective of maximizing total supply chain profitability rather than each stage devoting itself to its own profitability.

From the theoretical framework, Electronic supplier management practice is explained by the Resource Based View Theory. Kim and Narasimhan (2002) asserts that supply chain integration links an organization with its customers, suppliers and other channel members by integrating their relationships, activities functions, processes and locations. Successful supply chain management requires cross-functional integration of key business processes within the company and across the network of companies that consist of the supply chain. Organizations must integrate their operations with trading partners in order to sustain competitive advantage for the whole supply chain.

2.2.5 Contingency Theory of Management

The contingency theory of leadership was proposed by the Austrian psychologist Fred Edward Fiedler in his landmark 1964 article, "A Contingency Model of Leadership Effectiveness" (Northouse, 2007). The contingency theory emphasizes the importance of both the leader's personality and the situation in which that leader operates. Fiedler measured leadership style with the Least Preferred Co-Worker Scale (LPC scale.) The leaders scoring high on this scale are relationship motivated and those scoring low are task motivated (Northouse, 2007). Central to contingency theory is concept of the situation, which is characterized by three factors: Leader-member relations, deals with the general atmosphere of the group and the feelings such as trust, loyalty and confidence that the group has for its leader. Task structure, is related to task clarity and the means to task accomplishment. The position power, relates to the amount of reward-

punishment authority the leader has over members of the group (Northouse, 2007). These three factors determine the favorableness of various situations in organizations.

Northouse (2007) as a supporter of this theory highlights the major strengths of the Contingency. According to Northouse (2007), Contingency theory has survived over the decades as a valid and reliable approach how to achieve effective leadership because it is grounded in empirical research. Researchers who have followed Fiedler have validated contingency theory with their own research. Contingency theory has also been proved to have 'predictive powers' in determining the type of leadership that is most likely to be effective in particular contexts. Contingency theory suggests not to expect leaders to be equally effective in all situations and therefore organizations should consider leaders in optimal situations according to their leadership style. Contingency theory supplies data on leadership styles that could be useful to organizations in developing leadership profiles for human resource planning.

Contingency theory, although having several strengths, generally falls short in trying to explain why leaders with certain leadership styles are effective in some situations but not others. It is also criticized that LPC scale validity as it does not correlate well with other standard leadership measures. Contingency theory also fails to adequately explain what should be done about a leader/situation mismatch in the workplace (Northouse, 2007).

The contingency theory holds that circumstances play a critical role in determining the best possible response (Donaldson, 2001). Consequently, there is not good fit for all situations as other theories of management may tend to suggest. Each organization has unique circumstances and management has to tailor decision making to create best fits that address contextual issues. There are no predetermined notions that every organizations can fit into and there are no universal approaches that deliver results for every organization (Donaldson, 2001). All organizations have to attempt to uniquely respond to their circumstances and create a good fit for the emergent circumstances.

When applied to the procurement function, these theory lead to appreciation that the procuring environments are very different and unique. There are no models that are universal and can enable any organization that applies them to achieve procurement outcomes (Donaldson, 2001). While one approach works in one context or organization, the same approach would lead to failure when applied to other organizations. These are important considerations when it comes to adoption of e-procurement and actual procurement practices in organizations. E-procurement and procurement practices have to be adopted to fit the organizations unique circumstances thus stimulating optimal performance.

If the organization does not adopt its operations to circumstances or business environment contingencies, it will not be adequately fitted for operations in a given business environment leading to failures (Donaldson, 2001). This study considers adoption of e-procurement and contribution of e-procurement to procurement performance. This theory informs this study in terms of evaluating the adoption processes and how that aligns e-procurement practices towards stimulating procurement performance potential in an organization. The extent to which e-procurement practices are adapted to the unique procurement circumstances is the extent to which its efficiencies are likely to be realized by the organization. Some of the contingencies to consider are technology available, the capacity of suppliers or distributors and their interests, the capacity of consumers and their interests, government regulations and policy, and available capital for investment. Managers operating under the principles of contingency theory have to do more than just identify the one or two influences on an issue. They have to be prepared to evaluate multiple inputs that may all be contributing to a problem. Using the example of long lead times leading to poor deliveries, the manager may discover that not only non-application of electronic order processing and electronic material management contribute to the problem, but the company's revised payment program, poor procurement team coordination, a loss of supplier recognition and outdated application of outdated e-procurement policy all contribute to the single

problem. Contingency managers have to learn to integrate all of the threads that intertwine to make for effective decisions and problem-solving.

From the theoretical framework, supply chain performance is linked to the contingency theory of leadership. Supply chain management aims at linking each element of the manufacturing and supply processes from raw materials acquisition, processing of goods and up to the final end users of the product. It focuses on how firms utilize their suppliers' processes, technology and capability to enhance competitive advantage. The objectives of the supply chain are to provide service to customers, achieve low operating costs and minimize the assets in the chain (Skjøtt-Larsen *et al.*, 2007). Many companies are now looking at securing cost, quality, technology and other competitive advantages as strategies to pursue in a globally competitive environment and to achieve this many manufacturers are focusing on their supply chain management practices. Supply chain management emphasizes the overall and long-time benefit of all parties in the supply chain through co-operation and information sharing (Yu *et al.*, 2001).

2.3 Conceptual framework

A conceptual framework is a written or virtual product that explains, either in narrative or in graphically form, the main things to be studied, the key elements being variables, concepts and the presumed relationships among them (Mathieson, 2001). Conceptual framework are structured from a set of broad theories and ideas that help a researcher in properly identifying the problem they are looking at, frame their research questions and find suitable literature. Most academic research uses a conceptual framework at the outset because it helps the researcher to clarify his research question and objectives (Stratman & Roth, 2004).

To illustrate the fundamental concepts of E-procurement and supply chain performance, the independent variables and independent variable were identified from the literature review. The conceptual framework explained the relationship between the dependent and the independent variables in the study. The four independent variables were

considered include electronic tendering, electronic order processing, electronic supplier management and electronic material management.

The first independent variable conceptualized has having influence on the performance of supply chain was electronic tendering practice. According to Ngeno and Kinoti (2017), electronic data interchange, e-tendering, supply chain integration were found to have influence on effective supply chain management process on energy sector.

The second independent variable conceptualized has having influence on the performance of supply chain was electronic order processing practice. According to Mutangili (2014), E-ordering enables Network Members and their Suppliers to exchange EDI documents such as POs, acknowledgements, advanced Shipment Notices and Invoices electronically Provides means for centralized billing by suppliers to members, Reporting solutions, Fill Rate Management, Price Discrepancies, Standardization – POs, ASNs, Invoices, Drill-Down reports, Internet Parts Ordering , a single website for special orders, All documents can be viewed by staff on the EOP website, Archive, Thence track shipments, approving invoices for payments is managed all online.

The third independent variable conceptualized has having influence on the performance of supply chain was electronic material management practice. In terms of logistics, the main problems are wrong time of materials arriving to the site or even wrong quality, lack of information for materials arrival to the site or site stock, missing materials, unavailability of storage space, and waste of labour for materials searching on site. Technology can help to improve the tracking and delivery of the materials. Consideration can be given to how GPS, JIT, EOQ can be used to in managing the process using E-material management (Mueller & Mueller, 2010).

The fourth independent variable conceptualized has having influence on the performance of supply chain was electronic supplier management practice. According to Wachiuri (2015), effective supply management and its strategies for creating

competitiveness revolve around the on-time delivery of competitive quality goods and services, at a reasonable cost, involving the right business partners.

In this study, the dependent variable is supply chain performance. It is considered dependent since the success of any supply chain system depends application of E-procurement factors. According to (Muhia & Afande, 2015), E-Procurement can be viewed more broadly as an end-to-end solution that integrates and streamlines many procurement processes throughout the organization. According to Nyile and Shale, (2016), the use of e-procurement systems also is deemed to reduce ordering costs. The advent of web-based electronic procurement has been heralded as a revolution for the purchasing process delivering significant transactional economies and acting as a catalyst for a shift in the role and influence of the purchasing function within the organization (Croom, 2010; Osmonbekov *et al.*, 2012). Samadi and Kassou (2016) ascertain that supply chain information systems has an indirect effect on the performance of supply chains in manufacturing firms through systems such as Enterprise Resource Planning (ERP) and Supply Chain Management Systems (SCMS). The conceptual frame work is as shown in figure 2.1.

E-Procurement practices

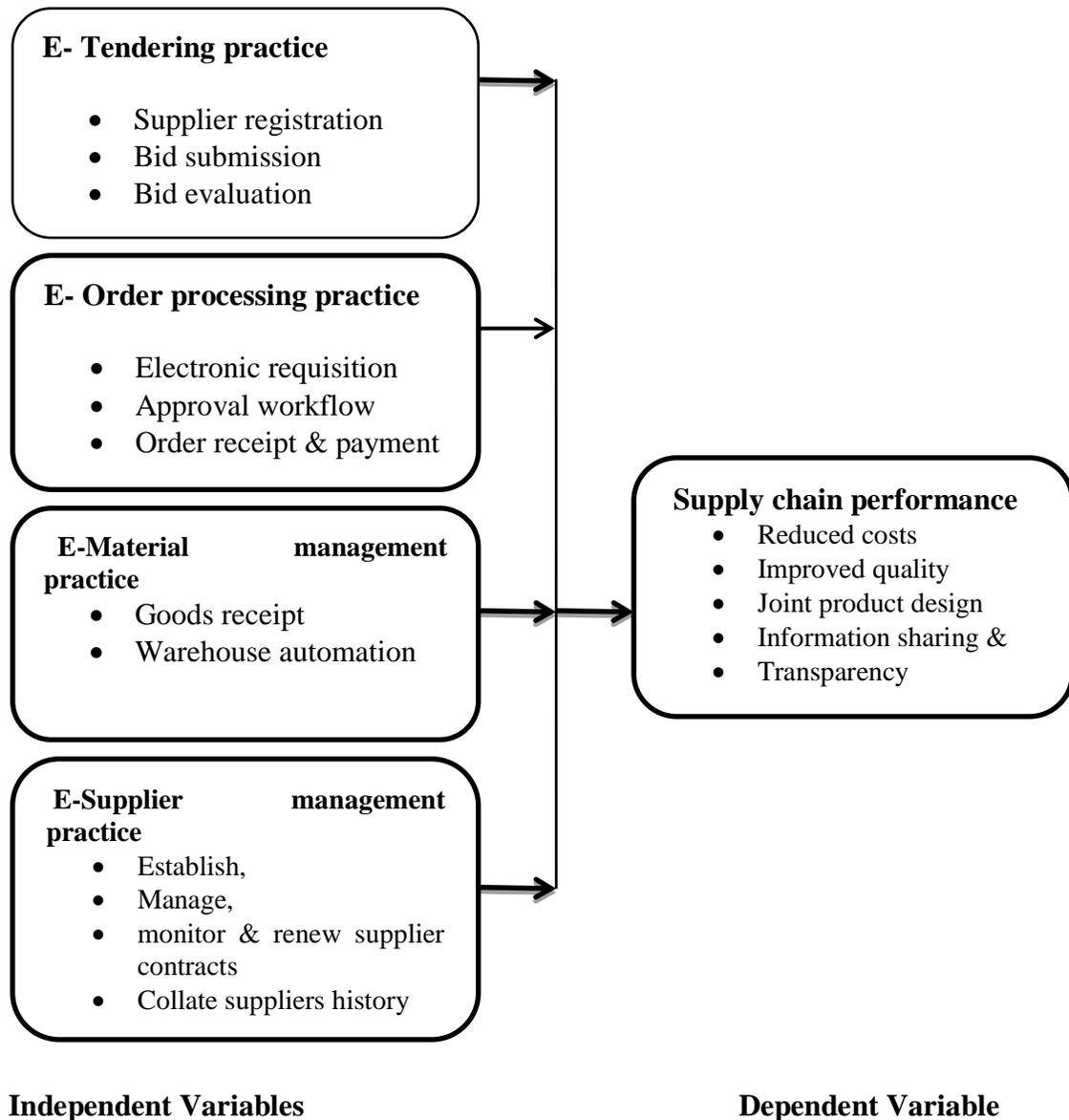


Figure 2.1: Conceptual Framework

Each independent single factor (E-tendering, e-order processing, E-material management and e-supplier management) of e-procurement act individually but have a collective impact on the effectiveness and efficiency on supply chain performance. If the degree of application for the four independent factors is high, then it is envisaged that

supply chain performance will be high and supply chain performance will be poor when the application of the independent factors is low.

Overall, e-procurement solutions in general are seeking to enhance supply chain effectiveness and efficiency through the automation of business processes. The adoption of e-business can result in benefits such as higher transparency, reduced transaction, manufacturing and other costs, reduced unmonitored corporate spending (also known as maverick or rogue purchasing) and more centralized purchasing spend and more coordinated and efficient collaborations for such projects as joint product design. E-business may also envisaged to facilitate collaboration and supply chain information sharing, such as order forecasts and inventory planning; automate requisition and purchase order creation and integrate payment processes; and help organizations develop plans for more effective management of sourcing and logistics.

2.3.1 Electronic tendering practice

Procurement departments are under pressure to reduce costs while maintaining timeliness and quality. Inconsistent procurement policies can result in the cancellation of projects, cost overruns and delays, staff dissatisfaction and litigation. Procurement policies must reflect the needs of the organization in question. After policies have been established, selecting the right electronic tendering tools and techniques through careful analysis can help you meet your procurement challenges. In recent years, public and private sector organizations have come under intense scrutiny to improve their procurement practices. Inconsistent procurement policies have resulted in the cancellation of projects, cost

Over runs and delays, staff dissatisfaction and litigation. Increasingly, stakeholders, shareholders and the general public are demanding that organizations take greater accountability for their actions.

Electronic tendering is an online process that manages the tendering cycle from the advertisement of the notice straight through to the issuing of an award. It provides a centralized process to help organizations improve efficiencies and accountability while reducing traditional tendering costs and increasing supply chain performance (Chen, 2004).

Frankwick (2004) argues that the electronic nature of an e-Tender marketplace means that a business never needs to miss an opportunity as they receive an email or SMS alert every time a relevant, new tender is published. Suppliers get the benefit of customers, who have usually already made a decision to purchase, coming directly to them. They don't have to spend time and money tracking down potential customers. They have a brand new sales channel with very little effort or cost.

Customers can let the suppliers do their research for them. Businesses that respond to the e-Tender will provide information about their products and services, their pricing, and any other information the customer might need to help them make the purchase. They will normally provide a link to their website and any customer testimonials that might be relevant. Rather than having to search the internet for this type of information, the customer completes one simple web-form and the suppliers do the rest (Palmer, 2003).

Smith (2000) asserts that E-tendering- is the process of sending Request For Invoices (RFIs) and Request For Purchases (RFPs) to suppliers and receiving the responses of suppliers back, using internet technology hence improving supply chain performance. Usually e-tendering is supported by an e-tendering system often the e-tendering system also supports the analysis and assessment of responses. E-tendering does not include closing the deal with a supplier. E-tendering smoothens a large part of the tactical purchasing process without focusing on the content that is spending category of that process.

An electronic based process wherein the complete tendering process; from advertising to receiving and submitting tender-related information are done online. This enables firms

to be more efficient in their supply chains as paper-based transactions are reduced or eliminated, facilitating for a speedier exchange of information thus high supply chain performance (Swan, 2000).

Traditionally E-tendering has been most commonly used by government agencies and the public sector rather than by the private sector. However, with increasing numbers of both business customers and consumers turning to the internet to research goods and services before making a purchase, e-Tendering is becoming a successful and efficient sales channel for a variety of organisations hence more efficient supply chain performance (Dexter, 2001).

In current era, Security is always prime thing to achieve in almost all aspects of business and organizations. Most of the businesses are tending towards remote transactions with the aid of web based computer systems. For the remotely controlled business, e-Tendering becomes most efficient and prominent approach. This process involves a seller, a buyer and a mediator web based computer system. To achieve this we must have a secure environment to maintain integrity of data and the confidentiality of the concern business. To achieve high security measures in e-Tendering, Public Key Infrastructure is implemented for the robust security and the process to provide secure web based environment guarantees the reliability of the overall system. It also uses asymmetric encryption/decryption technique to offer high shielded environment, (Malik, 2013).

Companies with authority to issue digital certificates play a crucial role in e-Tendering. In E-tendering process buyer and bidder act as key persons. When this process begins buyer and bidder both have to be registered for accessing web portal of E-tendering. Without registration a buyer cannot publish tender as well as bidder cannot bid for the tender. According Malik (2013), E-Tendering to be effected, Registration process, Submission process and Bid evaluation process are necessary.

Bid evaluation process will be carried out at buyer end where the buyer will create the committee. This committee is responsible for bid opening. After analyzing the entire bid will be evaluated and comparative report will be generated and result will be shared and appropriate supplier will get the award of contract.

2.3.2 Electronic order processing practice

Kim (2002) argues that E-ordering is the process of creating and approving purchasing requisition, placing purchase orders as well as receiving goods and services ordered, by using a software system based on internet technology which greatly improves the supply chain performance. In the case of e-ordering, the goods and services ordered are indirect goods and services such as, non-product related goods and services. The supporting software system an ordering catalogue system is usually used by all employees of an organization.

In case of Enterprise Resources Planning (ERP) the goods and services ordered are product related. It may be noted that ordering of direct goods and services usually is plan based. EDI electronic ordering is ideal for customers wishing to develop an automated purchasing system for orders. By eradicating repetitive manual processes and removing the need for paperwork, EDI electronic ordering solution enables the business to reduce costs, increase productivity and improve customer service thus improved supply chain performance (Bello, 2002).

Petersen (2005) asserts that online ordering system is an e-commerce function where a company allows customers to order products or services via their website. Since the Internet is booming, having an online ordering system can boost sales to some extent as it eases customers to place an order for the company's services. People can place orders from their home as long as they have a computer/laptop with Internet connection thus improved supply chain performance.

Electronic controlled substance orders are placed using a software program that has been approved for Controlled Substance Order System (CSOS). Typically, this software is available through a wholesaler and may be implemented into their ordering Web site. This software includes functionality to digitally sign the purchase order using the purchaser's CSOS digital certificate issued by DEA. A CSOS Certificate may be installed into multiple software programs and may also be transferred to multiple ordering computers (Sanders, 2004).

Sales and Purchase ordering appears to be a straightforward process but is in fact a major challenge for buyers and suppliers. Relying on paper, fax, email and phone based ordering means that there is a dependency on manual intervention which in itself can be slow but is proven to be liable to rekeying errors hence could increase the performance of the supply chain (Foster, 2002).

Order processing is a crucial element of order fulfillment and first stage of the fulfillment cycle. Order processing, using range of clear procedures, represent the basis of all logistics systems which makes it a key factor in logistics operations. Order processing starts with the receipt of or purchase requisition from the customer. We can receive orders in many ways whether it is faxes, phone, electronic file transfer / EDI or even methods that require manual data entry. Preferred method is to receive orders via file transfer at agreed daily slot times, normally e.g. once in the morning and once in the afternoon. The files are in a pre-agreed format that can be auto uploaded into the suppliers system without any data manipulation or manual data entry. This process ensures that human error is eliminated and also streamlines the entire order cycle, making it more effective and less time consuming, (Mutangili, 2014).

By deploying an Electronic Purchase Order Requisition system, in concert with an Accounts Payable automation solution, internal control over expenses, payables, disbursements, and suppliers can be enhanced. Going electronic allows for a much more efficient payable process by eliminating many of the manual tasks generally associated

with purchase order requisition. PO Requisition technology enables generation of POs and route them online for approval using Smart Routing technology. Upon approval, POs can be electronically invoiced from suppliers directly for an efficient paperless process. Automated matching occurs between the PO and the invoice when it arrives to validate price, quantity, line amount and items ordered. All invoices matched will be tracked against the PO until the PO is closed to account for blanket POs or partial payment against a PO. Matching rules can be configured for further control to ensure that invoices are properly matched to POs based on your existing business rules. Additionally, tolerances can be applied for the entire PO or down to the line item. Automated matching occurs between the PO and the invoice when it arrives. All invoices will be tracked against the PO in the case of a blanket PO or partial payment against a PO. Matching rules can be used for further control to ensure that invoices are properly matched to POs. Additionally, tolerances can be applied for the entire PO or any detail down to the line item, (Mutangili, 2014).

E-ordering enables Network Members and their Suppliers to exchange EDI documents: POs, acknowledgements, advanced Shipment Notices and Invoices electronically Provides means for centralized billing by suppliers to members, Reporting solutions: Fill Rate Management, Price Discrepancies, Standardization – POs, ASNs, Invoices, Drill-Down reports, Internet Parts Ordering , a single website for special orders, All documents can be viewed by your staff on the EOP website, Archive – All documents for 7 calendar years plus the current year, Track shipments, approve invoices for payments, manage all online,(Mutangili, 2014).

E-ordering as well as web-based ERP is the process of creating and approving purchasing requisitions, placing purchase orders as well as receiving goods and services ordered, by using a software system based on Internet technology. In the case of e-ordering the goods and services ordered are indirect goods and services (i.e., non-product related goods and services). The supporting software system (an ordering catalog system) is usually used by all employees of an organisation. In the case of web-

based ERP the goods and services ordered are product-related. These are called direct goods and services. Usually only the employees of the purchasing department (or the planning department) are using the supporting software system (a web-based ERP-system (Enterprise Resource Planning)). It may be clear that ordering of indirect goods and services usually takes place on an ad hoc basis, whereas ordering of direct goods and services usually is plan-based.

Presutti (2003) notes that some of the earliest e-procurement solutions focused on establishing ordering routines and reducing transaction costs associated with operating resource purchasing for typically maintenance, repair and operating (MRO) supplies by automating the requisitioning to payment cycle. E-business in procurement can enable organizations to order products in online catalogues or desktop purchasing systems whereby the requisitioner's authorization is electronically checked. The order information electronically passes through various checking procedures, e.g. authorization by relevant managers or directors. Once cleared, the order can be aggregated with others to the same destination and issued electronically to the supplier. This process flow reduces operational costs, improves process efficiency, delivers greater centralized control over purchasing and may increase negotiating power with suppliers through order consolidation (Huber & Wagner, 2007).

Alcatel was the first firm to effect complete electronic orders processing for direct goods was implemented in April 2005 with the supplier Swisscom. Since then, orders, delivery confirmations and invoices for the procurement of ADSL-net infrastructure have been exchanged completely paperless. This electronic invoice processing meets the specifications of the VAT authorities, a basic requirement for the waiving of the paper invoice and for the enforcement of input tax deduction. The functions to be supplied by Alcatel, mostly a combination of products and services, are specified in a comprehensive agreement. This forms the framework for the specifications and the orders, which are activated in SAP MM-Module and then transmitted through the transaction platform Conextrade to Alcatel. The XML standard from Rosetta Net is used for this. As soon as

the service is accepted by Alcatel, a delivery confirmation and, subsequently, an invoice to Swisscom Fixnet are transmitted by the same path. The latter is automatically reconciled in SAP MM-Module and finally approved for payment. (Christian Tanner, Ralf Wölfle, Michael Quade, 2006)

2.3.3 Electronic material management practice

Lean supply chain management is a comprehensive production management system developed by Toyota in Japan but perfected by other scholars and organizations that deals with elimination of waste and reduction of error reduced inventories costs bringing about efficiency and effectiveness. With the introduction of concepts like JIT (Just in Time) and VMI (vendor managed inventory), it is paramount that best practice organizations introducing lean supply chain management practices identify strong suppliers and develop those suppliers into partners. The report further states that a diverse supplier base and mentoring of suppliers by the buyer means that efficiency and effectiveness is achieved in service delivery. When conducting a new supplier appraisal whether electronic or manual, assessment emphasis is put on product quality, planning, supply assurance, customer focus and change control, (KPMG, 2012),

A supply chain of a certain product or a service essentially has three main parts, the supply, manufacturing and distribution. The supply side concentrates on how, where from and when raw materials are procured and supplied to manufacturing. Manufacturing converts these raw materials to finished products and Distribution ensures that these finished products reach the final customers through a network of distributors, warehouses and retailers. Effectively managing these flows can impact virtually all e-material supply chain, leading to profitable policies for continuous improvements in areas such as data accuracy, improving material quality, reducing lead times and reductions in operational complexity. Other benefits include: Improved delivery performance such as quicker customer response and fulfillment, rates especially in the field of IT which is changing very rapidly, greater productivity and lower costs,

reduced inventory throughout the chain, improved forecasting precision of demand, enhanced inter-operational communications and cooperation and more reliable financial information.

Supply chain management planning tools are intended to integrate the resource planning activities in a firm or organization. Some of the most common planning tools are: material requirement planning (MRP), manufacturing resources planning (MRPII), and Enterprise Resource Planning (ERP). A MRP is a tool that allows an organization to schedule production activities to meet specific deadlines based on the bill of materials, inventory levels, and master production schedule. An improvement of MRP tools is MRPII which integrates manufacturing capabilities and capacities with the benefits of MRP. An ERP tool allows the organization to integrate all processing information tasks related to all processes in the value chain. This is usually a single system that might include order management, inventory fulfillment, production planning, financial planning, and customer service in a company. It is the backbone of the logistic systems for a variety of firms (Bowersox *et al.*, 2007). Some other IT tools exist that can be used to execute or manage the various activities and relationships in the entire supply chain (Kumar 2001). These may include: data warehouse (DW), vendor managed inventory (VMI), distribution requirement planning (DRP), and customer service management (CRM). E-procurement support JIT and allows purchasing managers to make informed decisions on EOQ, reorder point and stock levels.

Materials management is an essential function that improves productivity in projects. Hence, the efficient use and management of material have an important influence on a company's profit and can avoid delays. In terms of purchasing and supply of materials, not matching materials with the ordering purchase, forgetting ordering materials, over or less materials, early or late materials arriving, lack of JIT strategy, lack of training and adequate management, lack of communication and relation between contractor and supply chain companies are the main obstacles. Some common problems on material management are more obvious which are namely: Failure to order on time which delays

the projects; Delivery at the wrong time which interrupts the work schedule; Over ordering; Wrong materials or error in direction of materials requiring re-work; Theft of materials from delivery into production; Double handling of materials because of inadequate material handling techniques. In terms of logistics, the main problems are wrong time of materials arriving to the site or even wrong quality, lack of information for materials arrival to the site or site stock, missing materials, unavailability of storage space, and waste of labour for materials searching on site. Technology can help to improve the tracking and delivery of the materials. Consideration can be given to how GPS, JIT, EOQ can be used to in managing the process using E-material management (Mueller & Mueller, 2010).

EDI technology is the electronic exchange of information between the computer systems of two or more companies. It is used to process transactions like order entry, order confirmation, order changes, invoicing, and pre-shipment notices. The EDI movement was started by big retailers like Wal-Mart, Kmart, and Target. To do business with some of these large customers, EDI processing is a requirement. EDI delivers results by facilitating the constant and rapid exchange of information between companies. Customer order, invoice, and other information that would previously require hours of data entry can be done in minutes. Point of sale data can be transmitted in a matter of minutes or hours instead of weeks. Methods that use changing roles include postponement strategies, vendor managed inventory, and supplier integration. Vendor managed inventory and continuous replenishment programs are ways in which organizations are reaching beyond their boundaries and integrating their efforts with suppliers and customers. Point of sale data is transferred from customer to supplier in real time so that automatic replenishments can occur. Companies can even surrender the responsibility for managing inventory to some of their suppliers. Supplier integration moves beyond partnering with suppliers and focuses on aligning with all critical suppliers the supply chain (Mueller & Mueller, 2010).

Basic technology like mobile telephony or laptop is the most common available at the moment. Some other technologies such as internet, RFID (radio frequency identification), GIS (geographic information system), GPS (global positioning system), tracking technology are available in which have the capability of tracking materials. Use of IT has the capability for changing a cultural structure with an objective by reducing barriers between different functionality. IT also is a great opportunity for communication between different parties and different activities. Electronic data interchange (EDI) and Electronic funds transfer (EFT) are some other technologies in IT that enable a retailer to electronically do some functionality such as purchasing orders, paying invoices and processing credit checks. On site positioning and tracking technologies facilitate arranging for the arrival of materials just in time with right quality and quantity on construction job site while keeping the work in process inventory on the site to minimum the cost and time. Radio frequency base information and communication technologies, such as global positioning system (GPS), radio frequency identification (RFID) tags and Bluetooth have matured and become commercially available to potentially support resource positioning and tracking and automated data collection in construction. GPS technologies have the capability of tracking, managing and controlling earth moving and mining operations which occur in relatively open areas (Mueller & Mueller, 2010).

2.3.4 Electronic supplier management practice

E-Supplier Management involves use of ICT to make informed decisions on sourcing the right suppliers by modules on Self-service supplier portal, standardized supplier qualification, Customized vendor registration forms, Centralized visibility of supplier data, Track supplier performance (KPIs), Promote supplier diversity, and Manage insurance certificates. Efficiently engage suppliers for sourcing events, analyze supplier responses, and make smart award decisions by use of modules such as Electronic bidding, Bid tabulation, Supplier response scoring, Efficient bid document distribution, RFI/RFP/RFQ templates, Sealed bidding, Reverse and forward auction and Audit trail of

transactions, Contract Management by Proactively managing supplier engagements to mitigate risk and ensure compliance by use Centralized supplier contract data, Custom contract fields, Contract document management, Subcontract visibility, Expiration alerts, Invoicing and payment tracking and compliance reporting. Telecommunications and computer technology allow all the actors in the supply chain to communicate among each other. The use of information technology allows suppliers, manufacturers, distributors, retailers, and customers to reduce lead time, paperwork, and other unnecessary activities. It is also mentioned that managers will experience considerable advantages with its use such as the flow of information in a coordinated manner, access to information and data interchange, improved customer and supplier relationships, and inventory management not only at the national level but also internationally (Handfield & Nichols, 1999). Also the advantages will include supply contracts via internet, distribution of strategies, outsourcing and procurement (Simchi-Levi *et al.*, 2003). All companies are looking for cost and lead time reductions with the purpose of improving the level of service but also to enhance inter-organizational relationships (Humphreys *et al.* 2001).

Kepher, Shalle and Oduma (2015) carried out a study on the role of supplier management on procurement performance in manufacturing sector in Kenya: A Case of East African Breweries. This study therefore was aimed at evaluating the role of supplier management on procurement performance in manufacturing companies a case of East African breweries. The specific objectives covered supplier integration, supplier quality management, supplier collaboration and supplier training. The study findings indicated that 81% of change in procurement performance at EABL can be explained by four variables namely buyer supplier integration, Supplier quality management, Supplier collaboration, and Supplier Training. Supplier performance management is key to procurement performance as suppliers are integrated into organizations activities. EABL has a strong collaborative relationship with its suppliers and undertakes measures to train them. This has improved procurement performance to great extent (94.6%). However, supplier integration and to be specific shared technology has not properly

been achieved. The study recommended that EABL should focus more on integration and to maintain or improve on supplier collaboration and supplier training.

Tim (2007) states that through the use of communication tools, such as the web sites, industrial organizations can build value in their supply chain relationships. Turner (1993) indicates that firms cannot effectively manage cost, offer high customer service, and become leaders in supply chain management without the incorporation of top of-the-line information technologies. Li (2001) identified 14 such information technology tools, among them electronic data interchange (EDI), enterprise resource planning (ERP), internet and extranets. Li grouped these tools into three groups in terms of their primary purpose: communication tools, resource planning tools, and supply chain management tools. Given this classification, two sub factors are considered in this research: Communication tools are used to facilitate data transfer and communication between the trading parts and this might include EDI, electronic fund transfer (EFT), intranet, internet, and extranet (Li, 2002). Electronic Data Interchange (EDI) is used for procurement (purchase orders, order status, and order follow-up). EDI serves as electronic catalogs for customers who can get information, dimensions, and cost about a specific product. EFT provides trading partners with an effective way to transfer funds from one account to another through a value added network (VAN) or the internet. Intranets are corporate local area networks (LAN) or wide area networks (WAN) that communicate through the internet and are secured by firewalls. Usually this type of communication tool is used inside a corporation that features different locations. On the other hand, extranet allows business to communicate and share business with external collaborators with a certain degree of security and privacy. Another type of communication tool is the internet, a uniform interface that allows global communication with the use of browsers (Bowersox *et al.*, 2007).

Manufacturing firms depend to a larger extent on their suppliers to avail the right products, in the right quality, quantity and in the right time. Ideally suppliers ought to be fast in responding to their buyer's needs. However, in many cases, supplier slackness

and laxity in responding to buyers needs has been a common occurrence characterized by increased lead times and cycle time. This has a negative impact to the buyers causing them to keep large buffer stock to cater for supplier uncertainty. Hence, it is paramount for firms to create relationships that boost the way suppliers respond to them. Hence, effective supply management and its strategies for creating competitiveness revolve around the on-time delivery of competitive quality goods and services, at a reasonable cost, involving the right business partners (Wachiuri, 2015). The sharing of information is a critical success factor if seamless product and money flows between initial suppliers and end-consumers in the ‘macro’ (or external) supply chain, as well as in the ‘micro’ (or internal) supply chain between different intra-organizational functions, is to be achieved. Inefficiency anywhere in the chain be it internal or external in nature will result in the chain as a whole failing to maximize its true competitive potential. The whole chain is only as strong as its weakest link. The most important problem encountered in both micro and macro supply chains, occurs when information about consumer demands becomes distorted on its way from the end-consumer to the initial supplier. A negative result of this information distortion is inaccurate demand forecasts and inefficient resource allocations, resulting in long lead times and high costs. Fast and accurate information sharing along all internal and external elements within a supply chain is a prerequisite for reducing this distortion (Nurmilaasko, 2008). Trent and Monczka (1998) describe two types of integration: the first one involves the forward coordination of the physical product flow from the suppliers to the customers; the second one entails the backward coordination of the information flow from the customers to the suppliers. Nurmilaasko (2008) identifies three levels of SCI: (a) manual SCI meaning human-to-human information sharing (examples telephone, fax, e-mails); (b) semi-automated SCI meaning human-to-system information sharing (example web portals); and, (c) fully automated SCI meaning system-to-system information sharing (middleware systems). Companies in the supply chain are striving to increase control over their suppliers as well as to obtain up-to-date and accurate information about their business partners to enhance their supply chain competencies and agility.

The use of the Internet also facilitates e-sourcing, which is the process of finding new potential suppliers using ICT with the aim of decreasing search costs. Identifying new sources of suppliers increase competition during the tendering process. Organizations can also take advantage of virtual electronic purchasing consortia (EPC) to electronically conduct tasks that are necessary for the management of demand aggregation between two or more legal entities. EPC can exploit the potential of economies of scale and scope without the diseconomies of increased transaction and communication costs (Corsten and Zagler, 1999) and result in average net reductions in purchasing costs of over five per cent and a return on investment of over 70 per cent (Huber *et al.*, 2004).

2.3.5 Supply Chain performance

Every CEO must always be concerned with the competition. In today's economy the battlefield is shifting from individual company performance to what we call Supply Chain Performance. Supply Chain Performance refers to the extended supply chain's activities in meeting end-customer requirements, including product availability, on-time delivery, and all the necessary inventory and capacity in the supply chain to deliver that performance in a responsive manner. Supply Chain Performance crosses company boundaries since it includes basic materials, components, subassemblies and finished products, and distribution through various channels to the end customer. It also crosses traditional functional organization lines such as procurement, manufacturing, distribution, marketing and sales, and research and development. To win in the new environment, supply chains need continuous improvement. To achieve this we need performance measures, or "metrics," which support global Supply Chain Performance improvements rather than narrow company-specific or function-specific (silo) metrics which inhibit chain-wide improvements (Hausman, 2017)

Presutti (2003) has defined Supply Chain performance as an evaluation of Supply Chain Management that includes both tangible and intangible factors. Wiengarten *et al.* (2010) suggests that e-Procurement system is more pivotal than other e-business applications

when studying Supply Chain performance since in the current economic environment, a value creation perspective is important for improving Supply Chain performance.

A procurement system is a vital component of a company's Supply Chain system. Typically, a company's procurement function is subdivided into strategic and operational processes since activities and priorities in these two areas are entirely different (Turban *et al.*, 2000). Supplier management, the pooling of purchase requisitions and procurement oriented product development are tasks that are typically assigned to strategic procurement. E-Procurement enables companies to decentralize operational procurement processes and centralize strategic procurement processes. This results to higher Supply Chain transparency provided by e-Procurement systems. Strategically, e-Procurement will help to consolidate purchasing practices that will lead to greater discounts and better service from suppliers. It also accelerates the flow of important information between the buyer and supplier, reduces administrative hours thus freeing the workers to do other work. This allows the organization to respond quickly to highly competitive new market entrants and improve the chances of winning new business (Egbu, 2004).

Procurement performance is the backbone of an organization success since it contributes to competitive purchase and acquisition of quality goods that puts the organization products or services in the competitive edge in the market. However, on several occasions, poor procurement performance has caused private and public sectors financial loss due to delivery of poor quality work materials, loss of value for money and inflated prices. Poor procurement performance also contributed to decrease of profitability of private sector (Juma, 2010). According to (Migai, 2010), poor procurement performance is a major hindrance to private sector organizations growth since it causes the delay of delivery, increase of defects, delivery of low quality goods or non-delivery at all. Poor procurement performance in the private sector has been a problem due to incompetent staff, traditional procurement procedures, and inability to embrace e-procurement, poor

coordination of procurement activities, lack of quality assurance policies and lack of proper regulations (Juma, 2010).

Performance measures need to determine the gap between actual and targeted performance and determine organization effectiveness and operational efficiency. Ideal measures of performance will lead to the attainment of double benefits-improvement of supply chain management and effective measurement of the achieved benefits. The performance measure can be grouped in to two; those that concentrate on financial measures such as profit return on investment and productivity. Also there are those measures that put more emphasis on less tangible and non-financial measures in performance measurements. Financial performance measure while important to shareholder, it provides too little information regarding the long-term effectiveness of firm in satisfying customers and hence the many organizations have successfully used product quality and customer service capabilities measures (Wisner *et al.*, 2010). In this study, the metrics for measuring the performance of the steel manufacturing companies was based on non-financial measures that include the product quality and customer satisfaction. Non-financial performance measures positively affect future performance of the organization (Banker, Potter & Srinivasan, 2000). Non-financial performance measures are also often considered as the process measures that should lead to good financial performance.

From an IS point of view, many tactical and operational benefits generated by procurement departments were achieved by employing web-based e-procurement systems supporting all major procurement innovations such as e-auctions, e-RFx and e-catalogs, (Rai, Brown, & Tang, 2009). Percy, Giunipero and Wilson (2007) summarized that the use of e-auctions within sourcing processes led to purchase price reductions of 30% in cable TV equipment, 20% in power equipment, 39% in medical supplies, 37% in public utilities, and 53% in U.S. armed forces' purchases. Further, Robinson, Sahin and Gao, (2005) found that the application of an automated e-replenishment system instead of a manual-based system leads to buyer-side operational

cost reductions of 19.6%, 29.5%, and 12.5% in traditional decentralized, decentralized with information sharing, and coordinated supply chain structures, respectively. Besides, supplier-provided, standardized e-catalogs along with electronically enabled self-service procurement processes disburden procurement departments from operational purchasing activities of non-production materials (Massauer, 2011). Generally speaking, the benefits of e-procurement can be summarized as product-related, process-related and inventory-related efficiency gains. A lot of research on different aspects of e-procurement systems has already been conducted. These aspects include procurement performance impact, (Teo & Lai, 2009) success factors (Puschmann and Alt, 2005) adoption issues indifferent geographical areas and industries, as well a variety of related analytical approaches, e.g., for bids election (Talluri, Narasimhan & Viswanathan, 2011). Considerable amount of research was conducted related to single e-procurement system components such as e-auctions, e-negotiation tools or reputation mechanisms.

Beamon (1999), mentions some features present in effective performance measurement systems and these include the following: inclusiveness (measurement of all pertinent aspects), universality (allows for comparison under various operating conditions), measurability (data required are measurable), and consistency (measures consistent with organization goals). Also, the strategic goals include key elements such as the measurement of resources (generally cost), output (generally customer responsiveness) and flexibility. Stevens (1990) states that to build up an integrated supply chain requires the management of material flow from three perspectives: strategic, tactical, and operational. From these perspectives, the use of systems, facilities, and people must be seen as a whole and work in a coordinated manner. He also mentions that a company can measure the supply chain performance by inventory level, service level, throughput efficiency, supplier performance and cost. Lear-Olimpi (1999) also stated that logistics play an important role in pursuing supply chain excellence which will lead to improved business performance (Lear-Olimpi, 1999). Another critical sub-factor of successful supply chain management is the analysis of the supplier market (Purchasing, 2007). An important point according to Canbolat, Gupta, Matera and Chelst (2008) is outsourcing,

which is significant in the supply chain management for the opportunities and risks that it offers. Then, this factor comprises four sub-factors logistics, supplier markets, supplier performance, and materials sourcing.

2.4 Empirical review

E-Procurement refers to the use of internet-based system used to carry out individual or all stages of procurement process, including search, sourcing, negotiation, ordering, receipt, and post-purchase review (Barngetuny & Kimutai, 2015). E-procurement refers to business-to-business or business-to-consumer or business-to-government purchase and sale of supplies, work and services through the internet as well as other information and networking systems, such as electronic data interchange and planning (Muhia & Afande, 2015). It is also known as electronic procurement or supplier exchange. According to Croom and Brandon-Jones (2004) e procurement is the use of internet-based integrated information and communication technologies (ICTs) to carry out individual or all stages of the procurement process including search, sourcing, negotiation, ordering, receipt, and post-purchase review. While there are various forms of e-procurement that concentrate on one or many stages of the procurement process such as e-contracting, e-information sharing, e-ordering and e-sourcing, e-Procurement can be viewed more broadly as an end-to-end solution that integrates and streamlines many procurement processes throughout the organization (Muhia & Afande, 2015).

E-Procurement is much more than just a plain vanilla system for making purchases online. It is a comprehensive platform - using the Internet to make it easier, faster and cost effective for businesses to source their requirements on a timely basis, and in a way that is aligned with organizational goals and objectives. In the current scenario, characterized by focus on key strategic initiatives, lesser time-to-market and increased global competition, e-Procurement aids organizations in streamlining their entire purchasing process, so that they can focus on core business activities and increase profitability. There is increasing use of internet technology to buy goods and services

from a number of known or unknown suppliers, to perform e-informing which is gathering and distributing purchasing information both from internal and external parties and to expand e-market sites on web-based Enterprise Resource Planning (ERP) to open up value chains. Buyers can access preferred suppliers' products and services, add to shopping carts, create requisition, and seek approval, receipt purchase orders and process invoices with integration to suppliers' supply chains and buyers' financial systems (Jessop, 2006).

Through e-procurement, web sites allow qualified and registered users to look for buyers or sellers of goods and services and perform transactions. Depending on the approach, buyers or sellers may specify costs or invite bids. Transactions can be initiated and completed. Ongoing purchases may qualify customers for volume discounts or special offers. E-procurement software may make it possible to automate some buying and selling. Companies participating expect to be able to control parts inventories more effectively, reduce purchasing agent overhead, and improve manufacturing cycles. E-procurement is expected to be integrated into the wider Purchase-to-pay (P2P) value chain with the trend toward computerized supply chain management (Martin, 2006).

Globally, e-procurement has gained popularity especially with the advent of technology. In United States of America for instance, rapid development of e-procurement was reported in early 2000 just before the recession. By the end of the same year, it was reported that all state functions were maintaining web presence in at least some stage of their procurement processes with some participating in online bidding (Reddick, 2004). In Malaysia, the government at some point issued a statement calling for all suppliers to use the e-procurement system (Yossuf *et al.*, 2011). Kaliannan *et al.*, (2009) pointed out that Malaysian public sector are going through a rapid change especially as far as adoption of technology is concerned. Adoption of e-government and particularly e-procurement is inevitable for the government. A review conducted by Commonwealth of Australia indicates that the National governments of Italy, New Zealand, Scotland, New

South Wales and Western Australia in 2005 revealed that these countries were already using e-procurement system for public procurement activities.

In Kenya findings show that e procurement is taking root with most organizations both private and public embracing technology. Barasa and Namusonge (2017) concluded that, the availability of websites to facilitate e-procurement within the County Government of Kakamega was low and this might affect their efficiency in procurement. In addition, placing orders for supplies online within the County Government of Kakamega was done to a low extent. There was also less availability and reduced application of e-procurement platform and practices in e-ordering within the County Government of Kakamega and this ultimately affects their efficiency in performance of the procurement function. However, in establishing the effect of E-ordering on efficiency in the County government of Kakamega, using regression analysis, the study concluded that there was a positive relationship between E-ordering and efficiency in the County government.

Waniani, Namusonge and Lagat (2016) found out that technological infrastructure available in Nzoia Sugar Company was considered to be adequate. A large portion (66.9%) of the respondents agreed that the company has adequate technological infrastructure to support e-procurement. This included hardware and software, the internet and technical expertise. 33.1% of the respondents disagreed that the technological infrastructure was not adequate to support e-procurement. They attributed this to unreliable internet and lack of scanners. The finding agrees with Lysons and Gillingham (2003) assertion that firms have made considerable gains as a result of having electronic integration system installed. The respondents agreed that Internet connection; poor network coverage and system failures are the challenges facing the Nzoia Sugar Company in e-procurement implementation and company have acquired the required ICT infrastructure to support e – procurement in advance. They disagreed on internal electronic communication on issues related to procurement using technologies other than email such as instant messaging; video conferencing and they strongly disagreed on permitting the suppliers to directly access the internal systems

such as Enterprise Resource Planning Systems and Technological integration of the e-procurement system with other internal systems. The respondents considered the security of data and information as the most important element in procurement. Technological infrastructure accounted for 11.38% of e-procurement implementation in Nzoia Sugar Company.

Mambo (2015) indicates that in Kenya, the government has recognized the adoption of ICT in service delivery to the public and citizen in general. This has gained momentum with the current government administration. Existing literature reveals that a number of organizations in Kenya have successfully adopted the use of e-procurement technology. It is of great importance to note that the ICT ministry plays a critical role in the success of the ICT implementation in the country. This is because ICT is one of the major drivers for the achievement of vision 2030 and therefore there is need to develop an ICT policy that will integrate the ICT sector to the national development. Therefore, under the government blue print for 2013-2017 notes that the ICT sector is important in the realization of the required improvement in productivity and empowerment of the citizenry.

Ratanya (2013) reveals that there is some level of e-procurement implementation among the large scale manufacturing firms in Nairobi. For instance, it was established that most of the large scale manufacturing firms have in place an information system that enables their departments to share information. This sharing of information is one of the preliminary foundations upon which e-procurement is founded. It is also evident from the study that most of the firms have a centralized procurement system that is made possible through information technology. The results further confirm that most of the firms practice online internal procurement. This implies that internal procurement activities are made possible due to e-procurement adoption and implementation.

Quinnox (2012), noted that e-procurement is a very comprehensive phenomenon which includes making strategic initiatives and it can be used in reorganizing the entire purchasing process. A properly implemented e-Procurement system can connect companies and their business processes directly with suppliers while managing all interactions. Khanapuri, Nayak, Soni, Sharma and Soni (2011) assert that there are a number of requirements relating to the adoption of e-procurement system. They include technology, objectives, information, staffing and skills. The above mentioned requirements make the adoption process to face a number of challenges such as Compatibility, Integration, Adoption and regular use by employees and lack of capacity by small suppliers.

Hsin Chang *et al.* (2013) argue that SC and information sharing are two crucial aspects when it comes to e-Procurement. Thus, e-Procurement can be seen as a facilitator for information flows and coordination of actions among actors in the supply chain (Hsin Chang *et al.*, 2013). Toktaş-Palut *et al.* (2014) has created a model for benefits of e-Procurement using an interpretive structural modeling (ISM) approach. They claim that the most important benefit of e-Procurement is the integration of shared information between organizations. Thus, the factor for a successful e-Procurement is well-integrated information sharing in order to boost other benefits and achieve an overall outcome of cost savings in the purchasing process. Furthermore, when e-Procurement and thus integration of shared information is implemented, additional benefits will occur (Toktaş-Palut *et al.*, 2014). E-Procurement enables companies to streamline processes and automate transactions. This will generate benefits such as a higher pace in sourcing processes, a more efficient purchasing process and increased volume of operations (Davila, Gupta & Palmer, 2003; Hashim *et al.*, 2013; Toktaş-Palut *et al.*, 2014).

Nafula and Namusonge (2017), effect of e-procurement practices on efficiency frontier of kakamega county government, major findings were that, the availability of websites to facilitate e-procurement within the County Government of Kakamega was low and this might affect their efficiency in procurement. In addition, placing orders for supplies

online within the County Government of Kakamega was done to a low extent. There was also less availability and reduced application of e-procurement platform and practices in e-ordering within the County Government of Kakamega and this ultimately affects their efficiency in performance of the procurement function. The study recommends that procurement departments in county governments should adopt a user-friendly information system that all suppliers can use with ease be they tech savvy or the old suppliers. This will reduce the bias on the use of electronic procurement and all will embrace it on procurement staff competencies.

Ngeno and Kinoti (2017) explored the effect of e-procurement on effective supply chain management process in energy sector in Kenya. The purpose of the study was to assess the effect e-procurement on effective supply chain management process in energy sector in Kenya. The study applied the research design where both qualitative and quantitative techniques were used. The study aimed at collating and collecting information from the respondents. The study employed stratified random sampling technique in coming up with sample size of 152 respondents from a total of 246 target population in the energy sector. All the variables, that is, electronic data interchange, e-tendering, supply chain integration were found to have influence on effective supply chain management process on energy sector.

Chegugu and Yusuf (2017) found out that majority 58% (186/321) of the respondents strongly agreed that there is increased competitiveness in the tender bid process in hospitals. In addition to the main finding, 6% (19/321) of the respondents agreed, 8% (26/321) of the respondents were undecided, 18% (58/321) of the respondents disagreed and another 10% (32/321) of the respondents strongly disagreed to the statement. Another 52% (167/321) of the respondents also revealed that there is an improved level of accessibility to medicine and services in the hospital. Other responses on the statement were that 8% (26/321) of the respondents agreed, 16% (51/321) of the respondents were undecided, 20% (64/321) of the respondents disagreed and finally, 4% (13/321) of the respondents strongly disagreed. Finally, 50% (161/321) of the

respondents revealed that the system has reduced the load of work and speeding the selection of the right supplier and thus reduced the Cost of the tendering process. Finally, 50% (161/321) of the respondents revealed that the system has reduced the load of work and speeding the selection of the right supplier and thus reduced the Cost of the tendering process. To add on to the finding of the study, 16% (51/321) of the respondents agreed, 6% (19/321) of the respondents were undecided, 14% (45/321) of the respondents disagreed and another 14% (45/321) of the respondents strongly disagreed with the statement.

Nyile and Shale (2016) in the study, role of sustainable procurement practices on supply chain performance of manufacturing sector in kenya: a case study of east african portland cement company, found out that the use of e-procurement systems has enabled prompt payment of suppliers, majority 34.7% to a large extent agreed as 26.5% to a very large extent agreed that the use of e-procurement has enabled prompt payment. This implies that there is a good rapport between suppliers and EAPCC since one of the elements that cause difference between an organization and suppliers is eliminated. The use of e-procurement systems also is termed to reduce ordering costs. 20.4% of the respondents to a very large extent agreed to the fact as 32.7% and 34.7% to a large extent and moderate extent respectively agreed on the same. This is because use of electronic systems in procurement reduces the costs of stationery and all other secretarial expenses like phone calls and supplier visits costs.

Matunga, Nyanamba and Okibo (2013) assessed the effect of e-procurement on efficient procurement in public hospitals. The objectives of the study were to assess the extent to which e-procurement had improved the quality of goods in public hospitals, to determine the extent to which e-procurement has reduced price charged for goods purchased in public hospitals and to identify the extent to which e-procurement has ensured best value for money in public hospitals procurement. The study established that Kisii Level 5 hospital uses e-tendering, e - quotations and e- sourcing as the main e-procurement applications and that the greatest challenges faced when using e-market provider was

inadequate funding, organization's inability to handle change management and lack of training of employees on how to use the system. The study concluded that public hospitals have adopted some of the e-procurement applications regardless of the challenges that accompany the adoption.

Fozia, Namusonge and Shaelle (2016) in their study, effect of electronic supplier management practices on the implementation of preference regulations on state corporations in Kenya, findings on electronic supplier management revealed that employees electronically search for new products in the market. Supplier prequalification is done electronically together with confirmation of new suppliers' references. Besides, appraisals on marginalized groups are done electronically though there is doubt whether new suppliers are searched for electronically. Also, it was not fully established whether new suppliers are evaluated electronically, if employees electronically interact with new suppliers, if employees electronically categorize new customers, whether employees electronically do E-auctions and if employees electronically do location search.

Kioko and Mwangangi (2017) carried out a study on the influence of e-procurement on performance of parastatals in Kenya. The main objective of this study was to analyze the influence of e-procurement on performance of parastatals. The specific objectives were to find out whether e-sourcing, e-informing, e-payments and e-tendering have a positive relationship with performance in parastatals. Results also showed that 3% of respondents indicated to very great extent, great extent was at 12 %, moderate extent was 37 %, while little extent was at 27% and not at all was at 21%. Results indicated that majority of the respondents 100 % agreed on the statement that e-bidding greatly influences market share. Further results indicated that 69 % of the respondents were in agreement that e-evaluation greatly influences market share. A 47% of the respondents agreed that availing tender documents online greatly influences market share. 100% of the respondents expressed agreement on the statement that e-bidding greatly influences profitability. Results indicated that majority of the respondents 96 % agreed on the

statement that e-evaluation greatly influences profitability. Results indicated that majority of the respondents 92 % agreed on the statement that availing tender documents online greatly influences profitability. 90% of the respondents expressed agreement on the statement that e-bidding greatly influences delivery time. Results indicated that majority of the respondents 88% agreed on the statement that e-evaluation greatly influences delivery time. Results indicated that majority of the respondents 87% agreed on the statement that availing tender documents online greatly influences delivery time. The average mean of all the statements was 2.5 indicating that majority of the respondents agreed on sourcing influence on performance of parastatals in Kenya. Based on the study findings, the study concludes that performance of parastatals can be improved by e-sourcing, e-informing, e-payment and e-tendering. Finally, the study recommended that public institutions should embrace e-procurement practices so as to improve their performance and further researches should to be carried out in other public institutions to find out if the same results can be obtained.

2.5 Critique of the existing literature

The advent of web-based electronic procurement has been heralded as a revolution for the purchasing process delivering significant transactional economies and acting as a catalyst for a shift in the role and influence of the purchasing function within the organization (Croom, 2010; Osmonbekov *et al.*, 2012). Although extensive research has generally been documented, few studies have been undertaken in Kenya on the role of e-procurement strategy in enhancing procurement performance. Njuguna, (2011) looked at the factors that have driven the adoption of e-procurement in telecommunication sector with a special focus on Safaricom Kenya Ltd. The study found out that despite the potential demonstrated by various researchers in the area, e-procurement implementation and its general adoption got off to a slow start. The use of new technology for procurement has generated great excitement because of its potential to reduce procurement costs and improve its strategic sourcing De-Boar (2012). However, little attention has been given to the role of e-procurement strategy on procurement

performance. In addition, the role of e-procurement attributes to such things as cost reduction, improved buyer/buyer collaboration, promotes compliance with respect to audits by all the drivers in supply chain management in spite of the disadvantages that its adoption and implementation would confer to the organizations and their supplies (Weele, 2012).

E-procurement includes negotiation with suppliers, and research and development co-ordination taking place on the internet and electronic market (Yen and Ng, 2013). Research conducted on B2C E-Commerce focus on factors which influence the purchasing decision of the customer in the online B2C world. Furthermore much academic research on the success and fail factors for the implementation of E-Procurements as well as the benefits of E-Procurement usage was found. While the importance of online B2C shopping as well as the importance of E-Procurement systems is recognized by many academic researchers and practitioners, limited research interest was given to the effects both research fields have on each other on consumer attractiveness.

2.6 Research gaps

In the study, to assess the effect e-procurement on effective supply chain management process in energy sector in Kenya (Ngeno & Kinoti, 2017), results indicated that electronic data interchange, e-tendering, supply chain integration were found to have influence on effective supply chain management process on energy sector. The study concludes that electronic tendering has positive and significant influences on effective supply chain management process in energy sector in Kenya. The study concludes that supply chain integration has a positive and significant influence on effective supply chain management process in the energy sector in Kenya. Lastly, the study concludes that enterprise resource planning has a positive and significant influence on effective supply chain management process in the energy sector in Kenya. The study addressed electronic data interchange, e-tendering, supply chain integration and left out some

important E-procurement components such as electronic order processing and electronic material management the which this study intends to fill.

Barasa, Namusonge and Okwaro (2017) investigated the effects of E-Procurement on organizational performance of Public organizations focusing on Bungoma County Government. The study was guided by the specific research objectives: To establish the effects of E-Tendering on the performance of Bungoma County Government, to establish the effects of E-Auction on the performance of Bungoma County Government, To establish the effects of E-Purchasing on the performance of Bungoma County Government and to establish the effects of E-Invoicing on the performance of Bungoma County Government. The study concluded that e-tendering, e-auctioning, e-purchasing and e-invoicing affect organizational performance. The study has not linked how supply chain performance impacts on the organizational performance the gap this study intends to fill.

Fozia, Namusonge and Shaelle (2016) in their study, effect of electronic supplier management practices on the implementation of preference regulations on state corporations in Kenya, findings on electronic supplier management revealed that employees electronically search for new products in the market. Supplier prequalification is done electronically together with confirmation of new suppliers' references. Besides, appraisals on marginalized groups are done electronically though there is doubt whether new suppliers are searched for electronically. The research was more geared towards finding out whether electronic supplier management practices were being used. This study aims at finding out whether electronic supplier management practices affect supply chain performance and come out with conclusions whether the effect on supply chain is positive or negative.

Most studies reviewed have concentrated on the effects of E-procurement with other variables like operational, compliance policy manuals and overall organizational performance. Studies carried out in Kenya focused on other areas of procurement and

logistics. Muhia and Afande (2015) studied the role of adoption of e-procurement strategy on procurement performance of state corporations in Kenya by focusing on Kenya Revenue Authority. Kioko and Mwangangi (2017) studied the influence of e-procurement on performance of parastatals in Kenya. Fozia, Namusonge and Shaelle (2016) studied the effect of electronic supplier management practices on the implementation of preference regulations on state corporations in Kenya. Nafula and Namusonge (2017) studied the effect of e-procurement practices on efficiency frontier of Kakamega County Government. Barasa, Namusonge and Okwaro (2017) studied the effects of E-procurement on the organizational Performance of County Governments in Kenya. A few studies have related e-procurement with Supply chain performance while none had studied such relationship in the sugar manufacturing sector the gap which this study intends to fill.

2.7 Summary

Procurement performance is the backbone of an organization success since it contributes to competitive purchase and acquisition of quality goods that puts the organization products or services in the competitive edge in the market. However, on several occasions, poor procurement performance has caused private and public sectors financial loss due to delivery of poor quality work materials, loss of value for money and inflated prices. Poor procurement performance also contributed to decrease of profitability of private sector. Procurement departments are under pressure to reduce costs while maintaining timeliness and quality. Inconsistent procurement policies can result in the cancellation of projects, cost overruns and delays, staff dissatisfaction and litigation. Procurement policies must reflect the needs of the organization in question. After policies have been established, selecting the right electronic tendering tools and techniques through careful analysis can help you meet your procurement challenges. In recent years, public and private sector organizations have come under intense scrutiny to improve their procurement practices. Inconsistent procurement policies have resulted in the cancellation of projects, cost over runs and delays, staff dissatisfaction and litigation.

Increasingly, stakeholders, shareholders and the general public are demanding that organizations take greater accountability for their actions.

In Kenya, the government has recognized the adoption of ICT in service delivery to the public and citizen in general. This has gained momentum with the current government administration. Existing literature reveals that a number of organizations in Kenya have successfully adopted the use of e-procurement technology. It is of great importance to note that the ICT ministry plays a critical role in the success of the ICT implementation in the country. This is because ICT is one of the major drivers for the achievement of vision 2013 and therefore there is need to develop an ICT policy that will integrate the ICT sector to the national development. Therefore, under the government blue print for 2013-2017 notes that the ICT sector is important in the realization of the required improvement in productivity and empowerment of the citizenry.

In the analysis of the use of e-procurement on performance of the procurement functions of county governments in Kenya, the results revealed that e-procurement is positively related with performance of supply chain function of County Governments in Kenya. The study therefore recommended that the Government come up with policies on adoption of e-procurement practices and provide critical resources and leadership in adoption of e-procurement. By deploying an Electronic Purchase Order Requisition system, in concert with an Accounts Payable automation solution, internal control over expenses, payables, disbursements, and suppliers can be enhanced. Going electronic allows for a much more efficient payable process by eliminating many of the manual tasks generally associated with purchase order requisition. PO Requisition technology enables generation of POs and route them online for approval using Smart Routing technology.

Supplier online selling accelerates access to up-to-date product data, pricing and delivery information, Web and Internet-based EDI-applications provide an efficient and effective way to automate the exchange of information between sellers and buyers,

Desktop purchasing systems (DPS) automate the buying operations, Online tools to publish requests for quote (RFQ) and requests for proposal (RFP) for supporting procurement activities, Online auctions assist to determine purchase prices and conditions for strategic and operational activities. The Internet is used for establishing online marketplaces where large numbers of buyers and sellers are brought together, a number of specialized applications such as catalog building, application integration, auction engines, payment and fulfillment services are available for use. With the help of an e-procurement system, buyers can easily follow products' prices and specifications purchased from suppliers, and they can submit their orders to suppliers by using electronic forms.

A good e-procurement system enables a firm to organize its interactions with its most critical suppliers, a set of built-in monitoring tool to help control costs, assure maximum supplier performance and keeping an open line of communication with potential suppliers during a business process. The system allows managers to confirm pricing and leverage previous agreements to assure each new price quote is more competitive than the last.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter explores the methodological approach for the study and it covers the design, population, sample, and data analysis. In addition, the research quality regarding validity, reliability was clarified. The chapter also covers the assumptions of the model, variable definition, measurement and diagnostic tests.

3.2 Research philosophy

Research philosophy refers to the assumptions and beliefs that govern the way we view the world. It is the foundation of knowledge, and the nature of that knowledge contains important assumptions about the view of the world, (Saunders *et al.*, 2015). Research philosophies could be positivism, interpretivism, realism or pragmatism. These philosophies share a common set of assumptions about the sources and the nature of knowledge, and their commonalities identify them as examples of broader philosophies.

From above the stated philosophies, the choice of this research philosophy is based on research hypothesis to be tested. In this regard, this study used a pragmatism research philosophy as mixed method designs of both quantitative and qualitative were used. The research needed to obtain as wide a profile as possible so design included a survey with demographic, Likert-scaled, and open-ended questions; however, the researcher also needed opinions, which are subjective, and best dealt with by qualitative methods.

Pragmatism research philosophy accepts concepts to be relevant only if they support action. Pragmatics recognise that there are many different ways of interpreting the world and undertaking research, that no single point of view can ever give the entire picture and that there may be multiple realities, (Saunders *et al.*, 2012). Positivism and interpretivism are two extreme mutually exclusive paradigms about the nature and

sources of knowledge. Many dissertation topics fall broadly within one of these two main paradigms. At the same time, there is an occasional need for seasoned researchers to “modify their philosophical assumptions over time and move to a new position on the continuum. Pragmatism research philosophy can integrate more than one research approaches and research strategies within the same study. Moreover, studies with pragmatism research philosophy can integrate the use of multiple research methods such as qualitative, quantitative and action research methods, (Collis & Hussey, 2014).

3.3 Research design

This study employed mixed research design as by gathering both qualitative and quantitative data through a questionnaire, interviews and observations. Mixed method research design was chosen because the research hypotheses are best answered by both qualitative and quantitative data. This study collected primary data by use of questionnaires and interviews were done to compare results of the questionnaire information. Results from qualitative research method were used to enhance, elaborate or clarify results from quantitative research method. Questions of frequency may best be explored by quantitative methods, and perception and opinion by qualitative. The questions dealt with both of these, and hence mixed methods were preferred. This “mixing” or blending of data provides a stronger understanding of the problem or question than either by itself. The mixed research design that consist both qualitative and quantitative approaches allows researcher to collect information from the people on their habits, opinions, attitudes and any other educational or social issues (Namusonge, 2010). Creswell (2014) showed that both forms of data provide different types of information. Each type of data collection has both limitations and strengths that can be combined to develop a stronger understanding of the research problem or questions (and, as well, overcome the limitations of each).

Mixed methods research is more specific in that it includes the mixing of qualitative and quantitative data, methods, methodologies, and or paradigms in a research study or set of related studies. These approaches to professional and academic research emphasize that mono-method research can be improved through the use of multiple data, methods, methodologies, perspectives, standpoints, and paradigms (Johnson & Christensen, 2014). This study is a mixed research design to gain an understanding of how E-Tendering, E-order processing, E-material management and E-supplier management impact on supply chain performance.

3.4 Target Population

The Target population for this survey included all the 12 sugar companies in Kenya, both Public and private owned. According to Kenya Sugar Board, there are 12 sugar manufacturing firms in Kenya (Bureau of labour statistics, 2017). Because factories are relatively few, a census study will be conducted on all the 12 firms in Kenya. The sugar sector in Kenya is considered a labour intensive sector with over 7,584 permanent people employed in the sugar industries (Bureau of labour statistics, 2017). Both private and public firms were considered to find out how E-procurement practices have enhanced supply chain performance given that such practices apply across these firms as shown in Table 3.1.

Table 3.1: Target population

Factory	Ownership	Target population
1.Muhoroni sugar Company	Public	716
2.Sony sugar Company	Public	1121
3.Mumias sugar Company	Private	1136
4.Nzoia sugar Company	Public	1202
5.Kibos & Allied sugar Company	Private	460
6.Miwani sugar Company	Public	79
7.Chemilil Sugar Company	Public	765
8.West Kenya sugar Company	Private	610
9.Soin sugar Company	Private	17
10.Butali sugar Company	Private	647
11.Transnara sugar Company	Private	734
12.Sukali sugar Company	Private	97
Total		7584

Source; Bureau of Labour Statistics, 2017

3.5 Sampling frame

In this study the sampling frame is the same as the population which comprises of all the 12 sugar Companies both public and private owned. They are 1. Mumias Suagr Company, 2. Nzoia Sugar Company, 3. Muhoroni sugar Company, 5.Chemelil sugar factory 6. West Kenya Sugar Company, 7. Soin Sugar Company, 8. Kibos Sugar & Allied Industries Ltd, 9. Butali Sugar mills, 10. Transmara Sugar Company, 11.Sukari Industries Ltd and 12.Miwani sugar factory, (KSD, 2017).A sampling frame is the source material or device from which a sample is drawn. It is a list of all those within a population who can be sampled, and may include individuals, households or institutions. Because a researcher rarely has direct access to the entire population of interest in social science research, a researcher must rely upon a sampling frame to represent all of the elements of the population of interest.

3.6 Sample and sampling technique

It was not possible to test every individual in the population because it could have been too expensive and time-consuming. This is the reason why the study applied sampling.

3.6.1 Sampling technique

Stratified random sampling was used to select the sample because the population is heterogeneous. The processing firms compose of different departments classified according to their skills. Therefore stratified random sampling method was applied to come up with the sample size. This according to Cooper and Schindler (2011) ensures that each manufacturing subsector is represented. The population was stratified into departments and level of seniority (senior, middle, lower managers or non- management cadre) in all the factories. Then simple random sampling without replacement was applied to draw respondents from each departments of Factory, Agriculture, ICT, Procurement, Finance, Audit, Strategy, Marketing and stores of the 12 factories. E-procurement strategy and its application is relevant at this level prompting the choice of the departments because these group of respondents are directly involved in the implementation of E-procurement policy. Questionnaires were distributes to members of each department systematically until the required number was achieved.

3.6.2 Sample size

Yamane (1967:886) formula to calculate sample sizes has been used to establish the sample size, $n=N/ [(1+N (e) ^2)]$, Where n is the sample size, N is the population size, and e is the level of precision. When this formula is applied to the population of 7584, we get Equation, $n= 7584/ [1+7584(0.05)^2] = 379$. The sample 379 was identified randomly from each of the 12 factories as shown in Table 3.2.

Table 3.2: Sample size

Factory	Ownership	Permanent Employees	Percent	Purchasing manager sample	Other managers sample	Total Sample size
1.Muhoroni	Public	716	9	1	31	32
2.Sony	Public	1121	15	1	55	56
3.Mumias	Private	1136	15	1	55	56
4.Nzoia	Public	1202	16	1	61	62
5.Kibos	Private	460	5	1	22	23
6.Miwani	Public	79	1	1	3	4
7.Chemilil	Public	765	10	1	37	38
8.West K	Private	610	8	1	29	30
9.Soin	Private	17	1	1	3	4
10.Butali	Private	647	9	1	31	32
11.Transnara	Private	734	10	1	37	38
12. Sukali	Private	97	1	1	3	4
Total		7584	100	12	367	379

Source; BLS, Wage employment in the sugar Industry, 2017

3.7 Data collection methods

This is a process of gathering and measuring information on targeted variables in an established systematic fashion, which then enables one to answer relevant questions and evaluate outcomes. The goal for all data collection is to capture quality evidence that allows analysis to lead to the formulation of convincing and credible answers to the questions that have been posed, (Lescroël *et al.*, 2014). The research was based on the collection of primary and secondary data.

3.7.1 Primary data

Primary data are information collected by a researcher specifically for a research need. The main data collection instrument was open and closed ended questionnaires that were self-administered, interview guide and observation. Open-ended questions allowed for a greater variety of responses from participants.

3.7.2 Secondary data

Secondary data was used to depict pertinent issues which existed before the study was conducted; it was used as a basis to confirm/contrast further findings of the study. Secondary sources of data were journals, conference reviews, books and magazine articles. Reports were also reviewed to gain understanding of the sugar processing firms which included reports of individual sugar processing firms, Global agricultural Information Network (GAIN), Kenya National Bureau of statistics (KNBS), Communications Authority (CA), Kenya Sugar Directorate (KSD) and Kenya National assembly (KNA). Secondary data are the data collected by a party not related to the research study but collected these data for some other purpose and at different time in the past. If the researcher uses these data then these become secondary data for the current users. These may be available in written, typed or in electronic forms. A variety of secondary information sources is available to the researcher gathering data on an industry, potential product applications and the market place.

3.8 Data collection procedure.

Both quantitative and qualitative data collection methods were applied. Data Collection is an important aspect of any type of research study as inaccurate data collection can impact the results of a study and ultimately lead to invalid results. The study adopted Likert Five Point rating scale of 5, 4, 3, 2, and 1, which was used to capture responses in the questionnaire. The format of a typical five-level Likert item: 1) Not at all 2.) To small extent, 3) Moderate extent, 4) Large extent, 5) Very large extent.

3.9 Pilot study

A pilot study to test the validity and reliability of the questionnaire was undertaken. The issues of validity, reliability and generalizability need to be addressed in order for the research findings to be accepted as appropriate. Threats to validity and reliability can never be eliminated thoroughly, but the researcher aimed in minimizing the level of these threats.

3.9.1 Validity

Validity is the extent to which a concept conclusion or measurement is well-founded and corresponds accurately to the real world. The word "valid" is derived from the Latin *validus*, meaning strong. The validity of a measurement tool (for example, a test in education) is considered to be the degree to which the tool measures what it claims to measure; in this case, the validity is an equivalent to accuracy (Brains, Willnat, Manheim, & Rich, 2011). Oliver (2010) considers validity to be a compulsory requirement for all types of studies. There are different forms of research validity and main ones are specified by Cohen *et al.* (2007) as content validity, criterion-related validity, construct validity, internal validity, external validity, concurrent validity and face validity. Measures to ensure validity of a research include but not limited to the following points: a) Appropriate time scale for the study has to be selected; b) Appropriate methodology has to be chosen, taking into account the characteristics of the study; c) The most suitable sample method for the study has to be selected; d) The respondents must not be pressured in any ways to select specific choices among the answer sets. Generalizability relates to the extent to which research findings can be applied to other various circumstances. The objectives of the pilot study are (1) to examine the validity of this study, (2) to determine the clarity and usefulness of the questionnaire, (3) to refine the procedures for the actual survey, and (4) to estimate the time required to complete the survey questionnaire and the length of time for questionnaire turnaround.

3.9.2 Reliability

To ensure content validity and relevance, the questionnaire was pretested on a pilot set of respondents who did not form part of the study's respondents but were knowledgeable in the study aspects. This enabled the researcher to revise the questionnaire based on the pilot feedback. On the other hand, to ensure face and construct validity, the questionnaire was guided by researcher's conceptual framework. Pilot study was carried out by sending out 12 questionnaires and the collected data analysed and subjected to cronbach's alpha coefficient of reliability. According to (Ventura *et al.*, 2013; Waithaka *et al.*, 2014) Cooper, the general reliability coefficients around 0.9, was considered excellent, values around 0.8 as very good and values around 0.7 as adequate.

3.10 Data analysis and presentation

The data collected was analyzed qualitatively and quantitatively.

3.10.1 Qualitative analysis

Qualitative analysis provided provide in-depth information of the study while quantitative analysis enables the use of statistics to give better understanding of data collected. Qualitative data which is non-numerical gathered by interviewing procurement managers and was presented in from of short lists of responses and applied in order to analyze data qualitatively by, summarizing meanings, categorizing of meanings, structuring of meanings using narrative, coded the meaning into themes. Thematic analysis was applied to present the findings gathered from interviews.

3.10.2 Quantitative analysis

Quantitative data was analyzed using descriptive statistical method; the statistical tools such as mean, mode and standard deviation were used. Inferential statistic such as Pearson correlation coefficients and multiple regression models were used. Multiple regression analysis was employed to test the hypotheses. Multiple regression analysis

was applied to analyze the relationship between a single dependent variable and four independent variables. The results were fitted in the regression model below for prediction.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon,$$

Where: Y = Supply chain performance (value of dependent variable),

$\beta_0, \beta_1, \beta_2, \beta_3, \beta_4$ are regression coefficients to be estimated

X_1 = E-Tendering practice

X_2 = E-order processing practice

X_3 = E-material management practice

X_4 = E-supplier management practice

ε = error term

3.10.3 Assumptions of the regression model

There are assumptions which justify the use of linear regression models for purposes of inference or prediction. The model was assumed to have; Normality in that the sample data has been drawn from a normally distributed population, Linearity of the relationship between dependent and independent variables, Multicollinearity, Homoscedasticity (constant variance) of the errors and autocorrelation, Independence of the errors that is (no serial correlation). If any of these assumptions is violated (example if there are nonlinear relationships between dependent and independent variables or the errors exhibit correlation, heteroscedasticity, or non-normality), then the forecasts, confidence intervals, and scientific insights yielded by a regression model may be (at best) inefficient or (at worst) seriously biased or misleading.

3.10.4 Variable definition and measurement

Variables are the observable characteristics or events that assume a range of values during the research. Dependent variable is the outcome variable measured in each subject, which may be influenced by manipulation of the independent (operationalizing) variable. The basis of the topic of this study was the increased concerns about poor supply chain performance for none application of most E-procurement practices in the procurement processes, (CIPS, 2016). Hence this study was to examine whether E-procurement practices enhanced supply chain performance in the sugar sector. At least several variables are related to the primary variable of interest. No one independent variable (E-procurement practice) on its own can explain the dependent variable (supply chain performance) in this study population. If the quality of the measures and collected data are poor, every action and result that follows will also be poor, thus affecting reliability, validity, and credibility in a negative way. Optimally designed and executed survey studies prioritize measurement. They are reliable, meaning measurement is consistently applied. They are also valid, meaning truth and meaning in the measurement is applied. Finally, they are credible, meaning the results are subjectively, as well as objectively, believable. The operational definition of a variable is the specific way in which it is measured in that study. Another study might measure the same conceptual measure differently. Levels of measurement of the dependent variable to indicate the precision of the measurement will be ordinal by use of likert scale. The level of measurement of the dependent variable is one factor that determined the choice of statistical tests that were used to analyze the data.

To operationalize the research variables, the study first determined the indicators/parameters of each independent variable and then employed ordinal/Likert scale to measure the independent variables. For the dependent variable, the study adopted the 11 items (measures) of Supply chain performance which included; reduces purchasing cost, improves efficiency and time taken to complete procurement process, standardizes purchasing process across the organization, reduces administrative cost

with better effectiveness, improves effectiveness of supply chain processes(standard process), reduces discretion & increases transparency, improves supply chain managers decision making, reduction in errors of order transmission, reduces procurement corruption and reduction in inventory. Based on theories and models in the literature review, the scale comprised an ordinal scale of 1-5. The responses to the items were made using a 5-point Likert scales, ranging from 'strongly agree' to 'strongly disagree'. A Likert scale is selected as the appropriate measurement scale, seeing that the purpose is to gain an understanding of the influence of E-procurement practices on supply chain performance. A Likert scale is an appropriate measurement scale to measure cognitively, affectively and behaviorally based attitudes (Cooper & Schindler, 2006) such as beliefs about electronic procurement and supply chain performance.

For the independent variables, the study adopted 11 items to measure E-tendering practice, 5 items to measure E- order processing practice, 6 items to measure E-material management practice, and 6 items to measure E-supplier management practice. The responses to the items were made using a 5-point Likert scales, ranging from 'strongly agree' to 'strongly disagree'. Interview guide was used to interview the purchasing managers of the factories where data was collected. Simple and precise questions were set out and administered to the respondents and responses noted by the interviewer.

3.10.5 Diagnostic tests

Regression diagnostic is one of a set of procedures available for regression analysis that seek to assess the validity of a model in any of a number of different ways. This assessment may be an exploration of the model's underlying statistical assumptions, an examination of the structure of the model by considering formulations that have fewer, more or different explanatory variables, or a study of subgroups of observations, looking for those that are either poorly represented by the model (outliers) or that have a relatively large effect on the regression model's predictions. Assumptions of linear regression models were validated so that the ordinary least squares (OLS) can provide

reliable estimates of the parameters (Long & Ervin, 1998). This study therefore evaluated these assumptions by testing for linearity, autocorrelation, multicollinearity and heteroscedasticity. Lundahl and Silver (2014) tested for linearity, heteroscedasticity and common method bias in their study on, Aiming for a perceived partnership in relationship lending a viable tool for differentiation in financial services?

a. Linearity

There must be a linear relationship between the outcome variable and the independent variables. Prior to performing linear regression analysis, researcher tested the data for linearity to find out whether data that was sampled from a population that relates the variables of interest was in a linear fashion. Based on the ANOVA, value sig. deviation from linearity of p-value greater than 0.05 it can be concluded that there is a linear relationship between the dependent and independent variables.

b. Heteroscedasticity

The crucial assumption of classical linear regression model is that the volatility that has occurred in the model should be uniform in nature (homoscedasticity). If the assumption is not satisfied by the model, then one would have to consider the model to have been exposed to heteroscedasticity problem. Based on the Glejser's test for heteroscedasticity, output sig. coefficients greater than 0.05, it can be concluded that there is no heteroscedasticity problem.

c Autocorrelation

Another key assumption in regression model is that the error terms are independent of each other. This study presents a simple test to determine whether there is autocorrelation (serial correlation), i.e. where there is a (linear) correlation between the error term for one observation and the next. When auto-correlation is present, it is suspected that t values for regression parameter's estimates are unduly large making

corresponding p-values unduly small. In other words, in presence of auto-correlation, regression parameter's estimates may wrongly be interpreted as significant. Durbin-Watson statistic should be between 1.5 and 2.5 and if the rule is true then the data is not auto correlated.

d. Multicollinearity

Further to the reliability tests a multi-co linearity test was done to ensure that the accepted independent variables did not exhibit co linearity amongst themselves. A situation in which there is a high degree of association between independent variables is said to be a problem of multi-co linearity which results into large standard errors of the coefficients associated with the affected variables. According to Mugenda and Mugenda (2012), multi-co linearity can occur in multiple regression models in which some of the independent variables are significantly correlated among themselves. In a regression model that best fits the data, independent variables correlate highly with dependent variables but correlate, at most, minimally with each other. Multi-co linearity is associated with VIF above 5 and tolerance below 0.2. Cohen, Cohen, West and Aiken (2013), provided that a VIF statistic above 5 is an indicator of multicollinearity and should be removed from regression models.

e. Normality

The Kolgomorov-Smirnov test is a non-parametric test that can be used to test the underlying distribution of a given random variable. This was used to test whether the dependent variable and independent variables followed a normal distribution. If the P-values are less than 0.05 at 95% confidence, the study will conclude that the dependent variable and independent variables follow a normal distributed and hence fitting a linear model to the data was justified.

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSION

4.1 Introduction

This chapter presents the analysis of data and discussion of the research findings. The chapter outlines the findings based on the research objectives. With the help of SPSS statistical software, data on E-procurement practices and their impact on the supply chain performance of the respective sugar manufacturing firms in Kenya was analyzed using; mean scores, standard deviations, coefficients of variation and regression analysis. The research findings were presented in form of tables and graphs. Tabulation helped to summarize the data whereas graphs were used to present the study results.

4.2 Response rate

At the time of sending out questionnaires, Miwani sugar factory was not functional and hence no response was realized as the staff present was for care taking purposes. A total of 367 structured questionnaires were distributed to the twelve sugar factories. The study collected data from 266 respondents which constituted a response rate of 72.5% as shown by Table 4.1. Seven procurement managers were interviewed and this was 58.3% of the total 12 respondents.

Table.4.1: Response rate

Response rate	Frequency	Percent
1. Response	266	72.5
2. No response	101	27.5
Total	367	100

4.3 Pilot results

The data gathered was subjected to cronbach's alpha coefficient of reliability. According to Zinbarg (2005), cronbach's alpha is a coefficient of reliability that gives an unbiased estimate of data generalizability. A commonly accepted rule of thumb for describing internal consistency is 0.7 (Ritter, 2010).The data was then analyzed and the results were correlated to determine their reliability coefficients. The dependent and independent variables were found to be more reliable with alpha coefficients of more than 0.70, which is acceptable in the non-clinical research work. From the results of the pilot study on Supply chain performance scale had a reliability coefficient of 0.882, E- Tendering practice scale had a reliability coefficient of 0.914, E- Order processing practice scale had a reliability coefficient of 0.877, E-Material management practice had a composite reliability coefficient of 0.735, E-Supplier management practice scale had a reliability coefficient of 0.942 and all variables combined had a reliability coefficient of 0.971. An alpha coefficient of 0.7 was achieved in all variables and therefore this was indicative that the research tool was sufficiently reliable to carry out the study without further amendment as shown by table 4.2.

Table.4.2: Summary of Reliability statistics

Variable	Cronbach's Alpa	N of items
1.Supply chain performance	0.882	11
2.E- Tendering practice	0.914	11
3.E- Order processing practice	0.877	5
4.E-Material management practice	0.735	6
5.E-Supplier management practice	0.942	6
All variables combined	0.971	39

4.4 Descriptive results

The study used descriptive statistics to present the frequency and the percentages of the gathered data on the influence of E-procurement practices on supply chain performance of sugar manufacturing firms in Kenya.

4.4.1. Electronic tender processing practice

Respondents were asked their opinion whether E-tender processing practice enhances supply chain performance to which a majority 95.1% were of the view that E-tendering practice enhances supply chain performance while 4.9% had a contrary view as shown in Table 4.3. However, interviews on e-tender processing practice, indicates that all the 7 (100%) procurement managers agreed that E-tender processing practice enhance supply chain performance and the benefits of E-tender processing practice.

Table.4.3: Whether Electronic tender processing enhances SC performance

Response	Frequency	Percent
1. No	13	4.9
2. Yes	253	95.1
Total	266	100.0

4.4.2. Results of electronic tendering practice on supply chain performance

Respondents were asked their opinion on how E- tendering practice affects supply chain performance and they indicated that E-tendering practice reduced tender processing time (mean 4.38). They further indicated that E-tendering practice eliminates postal, printing & storage costs (mean 4.37). They indicated that suppliers were moderately able to access tenders/quotation/requests any time anywhere in the world (mean 3.95). Respondents agreed that to a large extent alteration of tender documents was impossible

or easy to detect (mean 4.16). They indicated that e-tendering aid an audit trail as neither party can deny sending or receiving documents (mean 4.02). However, they noted that ability to eliminate non-compliant bids automatically was possible to a moderate extent (mean 3.74). It is noted that it provided fairness to all regardless of geographic location of a supplier (mean 4.18). Respondents agreed that E-tendering practice improved audit trails to a large extent (4.10). Respondents indicated that E-tendering practice slightly reduced corruption (mean 3.94). They indicated that e-tendering practice had been affected by Computer/network malfunctions in bid submission (3.91) as shown by table 4.4.

Interviewed procurement managers indicated that E-tender processing reduced human error in the supply chain (5 out of 7 managers). They agreed that E-tender processing practice enables buyers to monitor tender processing effectively and that E-tender processing enabled many suppliers to put in their bids because the advertisement of tenders is seen by many prospect suppliers (4 out of 7 managers).

This concurs with findings of Rotich, Muma and Waruguru (2015) in the study, Relationship Between E-Tendering and Procurement Performance Among County Governments in Kenya, results revealed that e-tendering is positively related with performance of supply chain function of County Governments in Kenya.

Findings also concur with the study of Nyagah and Mwangi (2015), Influence of e-procurement implementation on supply chain performance in dairy industry in Kenya, that there is a positive correlation between supply chain performance and E-order Processing and that E-order Processing influences supply chain performance to a great extent.

This also concurs with in the study by Geoffrey, Muma, Kioko and Mwangangi (2017) on the influence of e-procurement on performance with reference to parastatals in Kenya, found out that Quality of goods purchased recorded positive growth, timely purchases and stock out reduction further recorded positive growth, cost reductions due

to minimal or no reworks also recorded positive growth. From inferential statistics, a positive correlation is seen between each determinant variable and performance of parastatals.

Aruguru (2015), relationship between E-Tendering and Procurement Performance among County Governments in Kenya where the findings were that e-tendering has remarkably improved the tendering process through its merits such as efficiency, transparency and cost effectiveness. The findings also concur with the study by Wanyonyi and Moturi (2015) that established that information technology helped in reducing ordering time and follow up. Online communication, online tender advertising and computerized tendering process has an influence on performance of the procurement function as it offers smoother and faster process flow and efficient distribution of information. This enables an institution to know when to make an order. Barasa, Namusonge and Okwaro (2017) in the study, effects of E-procurement on the organizational Performance of County Governments in Kenya: A Case study of Bungoma County Government, concluded that e-tendering plays a vital role to enhance organizational performance of the county government.

The findings of the study are supported by the Electronic market Hypothesis in terms of cost, time and easy access by buyers to the electronic markets. The theory present that traditional economics describe the two basic mechanisms for coordinating the flow of products/services between buyers - suppliers; markets and hierarchies. In markets, buyers can search goods from many suppliers and market forces of supply and demand define the design, price, quality and delivery schedule of the items. As buyers must search all suppliers, they incur transaction and co-ordination costs. So, if the coordination and transaction costs are large, hierarchical coordination between buyers and suppliers are preferable. In their EMH, Malone *et al.* (1987: 486) stated that: “by reducing costs of coordination and transactions, IT will lead to an overall shift toward proportionately more use of e-markets – rather than hierarchies”.

Table.4.4: Electronic Tendering practice

Statements	N	Mean	Std. Dev
1. Reduces tender processing time.	266	4.38	0.70
2. Eliminates postal, printing & storage costs.	266	4.37	0.67
3. Suppliers are able to access tenders/quotation/requests any time anywhere in the world	266	4.42	0.72
4. Tender documents cannot be accessed by unauthorized person	266	3.95	0.94
5. Alteration of tender documents is impossible or easy to detect.	266	4.16	0.82
6. Neither party can deny sending or receiving documents	266	4.02	1.03
7. Ability to eliminate non-compliant bids automatically	266	3.74	1.09
8. Provides fairness to all regardless of geographic location of a supplier	266	4.18	0.85
9. Improves audit trails	266	4.10	0.94
10. Reduces corruption	266	3.94	1.06
11. Computer/network malfunctions can affect bid submission	266	3.91	1.00

4.4.3. Electronic order processing practice

Respondents were their opinion whether E-order processing practice enhances supply chain performance, majority 98.1% were of the view that E-ordering practice enhances supply chain performance while 1.9% had a contrary view as shown in Table 4.5.

Table.4.5: Electronic tendering on supply chain performance

Response	Frequency	Percent
1. No	5	1.9
2. Yes	261	98.1
Total	266	100.0

4.4.5 Results of electronic order processing practice on supply chain performance

On statements regarding electronic order processing, the respondents indicated that electronic order processing practice highly leads to reduced order processing time (mean 4.52). They further indicated that E-order processing practice significantly reduced paperwork thus reduced costs to the company (mean 4.40). It was also found out that E-ordering practice substantially reduced human errors (mean 4.18). E-ordering practice helped the supply chain personnel to monitor order due dates (mean 4.24). The study found out that E-order processing practice enabled electronic invoice payment thus improved supplier relationship (mean 4.17). The findings on electronic order processing practice are presented in Table 4.6.

The findings are supported by the dynamic capability theory in that by application of e-order processing, firms are able to respond to customer changes more quickly as enabled also by quick delivery of raw materials for production. This theory is related to the agility of e-order processing to cope and change with dynamic markets to be able to

provide goods and services to sugar processing to use in their production process in highly dynamic and competitive environment. Changes in marketing strategy, organizational structure as well as tastes and preferences among customers is prevalent and as to such sugar firms should be able to process customers' orders quickly. Evidently, e-procurement integrates the in-house and external procurement components to address dynamics in the way organizations achieve operational excellence by reducing cost and saving on time used to procure goods (Mwenga, 2016).

Table.4.6: Electronic order processing practice

Statement	N	Mean	Std. Dev
1. Reduces order processing time.	266	4.52	0.58
2. Reduces paperwork thus reduced costs.	266	4.40	0.79
3. Reduces human errors.	266	4.18	0.74
4. Assists to monitor order due dates	266	4.24	0.78
5. Electronic invoice payment improves supplier relationship	266	4.17	0.73

4.4.6 Electronic material management practice

Respondents were their opinion whether E-material management practice enhances supply chain performance, majority 97.7% were of the view that E-ordering practice enhances supply chain performance while 2.3% had a contrary view as shown in Table 4.7.

Table.4.7: Whether E-material management enhances SC performance

Response	Frequency	Percent
1. No	6	2.3
2. Yes	260	97.7
Total	266	100.0

4.4.7 Results of electronic material management practice on supply chain performance

Statements on electronic material management responses indicated that, respondents agreed that E-material management practice affects supply chain performance positively in that real-time stock levels enable inventory manager to quickly see which products have reached re-order level (mean4.43). Further the study established that Inventory levels in each warehouse is accessible to management for quick decision making (mean4.28). The study found out that E-material management practice enabled count of inventory throughout the supply chain from one point (mean 4.11). Respondents indicated to a moderate extent that by use of Bar codes store's inventory was automatically adjusted to account for items that left the store (mean 3.94). The findings also to a significant level that E-material management practice minimized inventory carrying costs as electronic information enabled better decisions on reorder quantities (mean 4.17). Respondents highly agreed that visibility of product availability was critical to efficient operations of the firm (4.11). The findings of electronic material management practice are indicated in Table 4.8.

Mogere, Oloko, and Okibo (2013) equipped that inventory management needs a proper control system because it is one of the largest assets of the company. Inventory investment and its control systems make up a big percentage of the total budget, this

required from the managers of these firms to pay a crucial efforts in building effective and efficient strategies that enhance handling the inventory and improve the operational performance. Kadima, Douglas, Kibet, and Manase, (2013), found that procurement function has a positive influence on the efficiency of supply chain cycle time, supply lead time, level of delivering supplies with free defect rate, flexible purchase order cycle time, supplier's ability to respond to quality problems, initiatives of cost saving, low rejection rate from supplies and the accuracy of the documentation for delivering the supplies. Lwiki, Ojera, Mugenda and Wachira (2013) pointed that controlling the inventory management is a crucial function in the industrial companies due to a significant blend of reasons. First, mismanagement of inventory threatens a firm's viability, consumes physical space, creates financial burden, and increases the possibility of damage, spoilage and loss. Second, reducing inventories often disrupts manufacturing operations and increases the likelihood of poor customer service.

The findings are also supported by Value chain theory with the value added being the information flow between the buyers and sellers. The firms are able to plan their production schedules and thus able to satisfy customers by well-planned materials and quick delivery schedules made possible by information between seller and buyer firms. Compared to the company-internal focus of Porter's value chain (1985), the supply chain extends the scope towards intra-company material and information flows from raw materials to the end consumer. Porter's value chain consists of a set of activities that are performed to design, produce and market, deliver and support its product.

Table.4.8: Electronic material management practice

Statement	N	Mean	Std. Deviation
1. Real-time stock levels enable inventory manager to quickly see which products have reached re-order level.	266	4.43	0.66
2. Inventory levels in each warehouse is accessible to management	266	4.28	0.80
3. Enables count of inventory throughout the supply chain	266	4.11	0.90
4. By use of Bar codes store's inventory can be automatically adjusted to account for items leaving the store.	266	3.94	1.05
5. Minimizes inventory carrying costs as electronic information enables better decisions on reorder quantities.	266	4.17	0.85
6. Visibility of product availability is critical to efficient operations.	266	4.11	0.92

4.4.8 Electronic supplier management practice

Respondents were their opinion whether E-supplier management practice enhances supply chain performance, majority 95.9% were of the view that E-ordering practice enhances supply chain performance while 4.1% had a contrary view as shown in Table 4.9.

Table.4.9: Whether E-supplier management enhances SC performance

Response	Frequency	Percent
1. No	11	4.1
2. Yes	255	95.9
Total	266	100.0

4.4.9 Results of electronic supplier management practice on supply chain performance

Respondents indicated E-supplier management practice highly enabled buyers and suppliers to develop a single shared forecast of demand and a plan of supply (mean 4.16). The study further found out that buyers issue orders of materials to the suppliers was streamlined (mean 4.08). It was found out that E-supplier management practice improved quick information sharing between buyers and suppliers (mean 4.18). It was found out that E-supplier management practice significantly improved predictability of flow of goods (4.03). It was further found out that electronic payment to suppliers improved delivery with the adoption of E-supplier management practice (mean 4.11). The study also established that E-supplier management practice improved relations with channel partners (mean 6.06) as presented by Table 4.10.

This concurs to the study conducted by (Shalle, Guyo, & Amuhaya, 2014) on the effects of buyer/ supplier collaboration on e-procurement performance in state corporations in Kenya, found out that supplier collaboration enhances procurement performance hence creating a competitive advantage through sharing information making joint decision, inter-procurement relationship. This indicates that the level of supply chain collaboration has an important interaction effect on the relation between external resources and buying firm performance, where e-collaborative forms of buyer-supplier exchange facilitate

greater access to external resources. This also concurs with the finding in the research, Relationship between E-procurement Adoption and Partnership Practice in Tea Firms, (Chirchir, 2015), that the electronic procurement adoption in tea firms has built partner relationships with suppliers, benefited in the reduction of cost, lead time and stable supply source and adopted the supply chain management practices. It has enhanced trust and partner relationship with suppliers using electronic procurement. The e-procurement adoption was found to make firm partner relationships improve supply chain performance.

The findings are supported by Resource Based View (RBV) theory developed by Barney and Wernerfelt in their analysis of heterogeneous firms. It asserts that the resources of an organization are key to ensuring that it performs well. These resources are what determines if an organization has an added advantage over the rest. As a result, exploiting surrounding opportunities using available resources in a new way is more efficient rather than acquiring new skills for each different opportunity. According to the RBV theory, resources can be classified into organizational capital resources, physical capital resources and human capital resources. Allocating them efficiently helps an organization to achieve greater performance (Lynch *et al.*, 2000). The internal resources of a firm will be used to make possible collaborations with the surrounding environment in the terms of raw materials by forging interaction of buyers with raw material firms for steady flow for continued production process. The resource of e-procurement platforms owned by both companies makes the collaboration possible.

Table.4.10: Electronic supplier management practice

Statement	N	Mean	Std. Deviation
1. Buyers and suppliers develop a single shared forecast of demand and a plan of supply	266	4.16	0.76
2. Buyers issue order of materials from the suppliers is streamlined.	266	4.08	0.70
3. Quick information sharing with suppliers	266	4.18	0.75
4. Predictability of flow of goods	266	4.03	0.77
5. Electronic payment to suppliers improve delivery	266	4.11	0.87
6. Improved relations with channel partners	266	4.06	0.87

4.4.10 Supply chain performance

Respondents were asked their opinion whether E-procurement practices enhance supply chain performance, majority 98.1% were of the view that E-procurement practices enhance supply chain performance while 1.9% had a contrary view as shown in Table 4.11. The findings support the fact that E-Procurement solutions are seen as a way to address efficient procurement requirements hence the reason why many firms are now responding to the need procurement reforms to enhance service delivery. The results from the interview method concurs with the quantitative analysis as all the 7 (100%) managers interviewed were of the view that E-procurement enhanced supply chain performance. The findings also concur with Boudijilda and Pannetto (2013) who found that most state corporations“ are fast adopting e – procurement to enhance their

procurement performance in their study on the economic justification for e-procurement in developing countries.

Table.4.11: Supply chain performance

Response	Frequency	Percent
1. No	5	1.9
2. Yes	261	98.1
Total	266	100.0

Interviews carried out on procurement managers led to some keys findings observed worthy noting in this study. All sugar processing firms in Kenya that were surveyed were practicing electronic procurement to undertake their procurement with the superior ERP system used found to be SAP as confirmed by 5 out 7 interviewed managers. Other sugar millers were using other systems that were ERP solutions such as Ebizframe, Syspro and Microsoft Navision.

High level of information integration was the major benefit of ERP systems usage. Information gathered by interviews indicates that the entire industry was in the process of switching over to SAP as indicated by 2 managers whose firms were using other ERP other than SAP at the time of the interview. In addition it was observed that some firms (2 out 7 managers interviewed) had stand-alone ERP systems for each module that resulted in delayed decision making because it resulted in extracting reports from different platforms then merging them manually which could result in data interference thus giving imperfect reports hence wrong decision making. It was observed that upgrading of ERP systems resulted in redesigning the existing business processes and customization of the software mostly in the firms using other ERPs other than SAP.

Despite the fact that all firms practice electronic procurement in the procurement of goods and services as confirmed by the 7 managers, there are major differences between private owned sugar processing firms (3 managers concurred) and public owned firms (4 managers concurred) when both were propped on e-procurement practices in their organizations'. The major differences noted include are indicated in five areas as below.

E-procurement is more advanced in usage in the public sugar sector than the private sugar firms. To a large extent (4 out 7 managers) indicated that procurement requisitions were done electronically and approvals done in the system but the approvals in the private firms are shorter and quickly effected as compared to the public firms. Repeat orders were more referent in the private firms that improved lead time considerably in private firms where quotations enquiries were done only when to compare prices and possibly change the supplier for an item. The major private sugar processing firm's point of reference and possible purchase of specialized spares were the OEM where in most cases an order is electronically processed immediately.

The application of electronic procurement in the private firms as indicated by 3 managers interviewed was majorly for accounting purposes to track procurements electronically through requisition, orders up to receipt and finally stock management. The reports are then easily captured in the financial books for reporting and future decision making. 3. E-tendering practice is least referent in private firms in that a direct enquiry progressed directly to E-order processing practice then to e-material management process and finally to E-supplier management practice with the most preferred E-action being e-invoicing and E-supplier payment.

To a greater extent, E-procurement personnel skills in private firms as per the 3 respondents were referent in e-material management practice of receiving, issuing and reporting of commonly used items. E-sourcing is done by the management who in most cases doubled up as the owner of the firm.

Electronic supplier management is practiced in both private and public sector with all the 7 managers indicating that the most practiced was electronic supplier payment in terms of RTGS offered by the supplier's banks. Also suppliers were able to pay for tenders through the Mpesa platform pay bill and banking directly to the buying organization bank accounts.

Observations during the study showed that goods were being received and issued electronically as proved by printouts of Goods Received notes (GRN) and goods Issue notes. Manual goods receiving and issuing books were not sited on the stores desks implying that the activities were electronically executed. System generated reports proved that report generation is electronic and when some respondents were requested to respond to some specific questions during the study, they were seen referring to the ERP system to check. This proved that e-procurement was being practiced and benefited the users in terms of reports retrievals.

4.4.11 Results of supply chain performance on supply chain performance

Respondents were asked to respond on supply chain performance statements and the findings indicate that the respondents agreed to a large extent that the application of E-procurement practices reduces purchasing costs as indicated by a mean score of 4.43. Further, it was their view that E-procurement practices improved efficiency and time taken to complete procurement process with a mean of 4.52. It had enhanced standardized purchasing processes across the organization with a mean score of 4.31. It had resulted to reduced administrative cost with better effectiveness (mean 4.22). Respondents agreed that E-procurement had improved effectiveness of SC processes (mean 4.24). It had resulted to reduced discretion and thus increased transparency (mean 4.27). It has enhanced SC managers decision making (mean 4.18) and the E-procurement practices had made possible reduced errors of order transmission (mean 4.20). However, respondents also indicated that E-procurement practices had slightly reduced

procurement corruption and inventory levels as indicated by the mean score of 3.85 and 3.94 respectively. The results are indicated in table 4.12.

The quantitative findings were supported by qualitative data by the 7 (100%) managers interviewed that E-procurement improved efficiency of the supply chain because procurement process time reduced, reduced process costs by elimination of most stationery, that e-procurement saves money by preventing duplicate spending, leveraging volume buying and that e-procurement saves the organization from needing more room and enhances file retrieval easy. On the issue of reports 6 (85.7%) out of 7 (14.3%) managers interviewed indicated that electronically conducting procurement makes it easier to write and analyze reports on procurement systems and this enables managers to make decisions based on reports that are accessible electronically any time.

The finding of the quantitative and qualitative concurs with a research that the quest to improve service delivery is becoming an important agenda for most governments (Kaliannan *et al.*, 2009; Vaidya & Hyde, 2011; Basheka & Sabiiti, 2011) and e-procurement has been introduced as a key strategic tool in increasing nations' competitiveness (Basheka *et al.*, 2012) and as a way to achieve better, more cost effective procurement systems, as well as greater transparency and accountability (Karthik & Kumar, 2013).

Given the digital processing of all the information related to public contracts, the costs with waste paper as well as man-hours assigned for organising the administrative work processes is dramatically reduced. Similarly, the cost of travel and staff allocated to logistical tasks also tends to be residual due to the introduction of technology in the process, (Fernandes & Vieira, 2015). This also concurs with the research, Role of E-Procurement Strategy in Enhancing Procurement Performance in State Corporations in Kenya, that as a higher percentage of enterprise spend and more spend categories flow through e-procurement systems, greater cost savings and other benefits are realized. E-procurement technology and other advanced technologies essentially are freeing

procurement professionals to become true supply managers at these enterprises, and the role of procurement is shifting from reducing costs to creating supply value for the company, (Shalle, Guyo & Amuhaya, 2013).

Findings also concur with the study of Nyagah and Mwanga (2015). Influence of e-procurement implementation on supply chain performance in dairy industry in Kenya: a case of new kcc limited, that there is a positive correlation between dependent variable; supply chain performance and independent variables; ERP, E-order Processing, information sharing and E- supplier appraisal and the study concludes that ERP, E-order Processing, information sharing and E- supplier appraisal influences supply chain performance to a great extent.

The study is proves right the Contingency Theory of Management in that supply chain management aims at linking each element of the manufacturing and supply processes from raw materials acquisition, processing of goods and up to the final end users of the product. It focuses on how firms utilize their suppliers' processes, technology and capability to enhance competitive advantage. If the organization does not adopt its operations to circumstances or business environment contingencies, it will not be adequately fitted for operations in a given business environment leading to failures (Donaldson, 2001). This study considers adoption of e-procurement and contribution of e-procurement to procurement performance. This theory informs this study in terms of evaluating the adoption processes and how that aligns e-procurement practices towards stimulating procurement performance potential in an organization. The extent to which e-procurement practices are adapted to the unique procurement circumstances is the extent to which its efficiencies are likely to be realized by the organization. The contingency theory emphasizes the importance of both the leader's personality and the situation in which that leader operates. Central to contingency theory is concept of the situation, which is characterized by three factors: Leader-member relations, deals with the general atmosphere of the group and the feelings such as trust, loyalty and confidence that the group has for its leader. Task structure, is related to task clarity and

the means to task accomplishment. The position power, relates to the amount of reward-punishment authority the leader has over members of the group (Northouse, 2007). These three factors determine the favorableness of various situations in organizations.

Table.4.12:1 Supply chain performance

Statement	N	Mean	Std. Dev
1. Reduces purchasing costs	266	4.43	0.74
3. Improves efficiency and time taken to complete procurement process	266	4.52	0.62
4. Standardizes purchasing process across the organization	266	4.31	0.69
5. Reduces administrative cost with better effectiveness	266	4.22	0.80
6. Improves effectiveness of SC processes (std process)	266	4.24	0.76
7. Reduces discretion & increases transparency	266	4.27	0.83
8. Improves SC managers decision making	266	4.18	0.78
9. Reduction in errors of order transmission	266	4.20	0.77
10. Reduces procurement corruption	266	3.85	1.00
11. Reduction in inventory	266	3.94	1.01

4.5 Diagnostic tests

Leedy and Ormrod (2010) posited, “Assumptions are so basic that, without them, the research problem itself could not exist”. The study tested five principal assumptions which justify the use of linear regression models for purposes of inference or prediction. They include linearity, autocorrelation, heteroscedasticity, normality and multicollinearity. If any of these assumptions is violated (i.e., if there are nonlinear relationships between dependent and independent variables or the errors exhibit correlation, heteroscedasticity, or non-normality, then the forecasts, confidence intervals, and scientific insights yielded by a regression model may be at best, inefficient or at worst, seriously biased or misleading.

4.5.1 Linearity

Prior to performing linear regression analysis, researcher tested the data for linearity to find out whether data that was sampled from a population that relates the variables of interest was in a linear fashion. Based on the ANOVA, value sig. deviation from linearity of $0.262 > 0.05$ and hence it can be concluded that there is a linear relationship between the dependent and independent variables as presented in Table 4.13.

Table.4.13: Linearity

		Sum of Squares	df	Mean Square	F	Sig.
Between Groups	(Combined)	47.382	27	1.755	11.413	0
	Linearity	42.688	1	42.688	277.612	0
	Deviation from Linearity	4.694	26	0.181	1.174	0.262
Within Groups		36.597	238	0.154		
Total		83.979	265			

4.5.2 Heteroscedasticity

The crucial assumption of classical linear regression model is that the volatility that has occurred in the model should be uniform in nature (homoscedasticity). If the assumption is not satisfied by the model, then one would have to consider the model to have been exposed to heteroscedasticity problem. Based on the output coefficients, the obtained Glejser's test for heteroscedasticity sig. of 0.08, 0.98, 0.29 and 0.09 are greater than 0.05 and hence it can be concluded that there is no heteroscedasticity problem as shown by table 4.14.

Table.4.14: Heteroscedasticity

	Unstandardized Coefficients	Std error	Standardized Coefficients	t	Sig.
(Constant)	0.55	0.12		4.46	0
E-tendering practice	-0.09	0.04	-0.21	2.35	0.08
E- order processing practice	0	0.04	0	0.02	0.98
E material management practice	-0.03	0.03	-0.09	1.05	0.29
E-supplier management practice	0.06	0.03	0.14	1.7	0.09

a. Dependent Variable:
AbsUt

4.5.3 Autocorrelation

Another key assumption in regression model is that the error terms are independent of each other. This study presents a simple test to determine whether there is autocorrelation (serial correlation), i.e. where there is a (linear) correlation between the error term for one observation and the next. When auto-correlation is present, it is suspected that t values for regression parameter's estimates are unduly large making

corresponding p-values unduly small. In other words, in presence of auto-correlation, regression parameter's estimates may wrongly be interpreted as significant. Durbin-Watson statistic should be between 1.5 and 2.5 and therefore the data is not auto correlated as shown by table 4.15.

Table.4.15: Autocorrelation

Model	R	R Square	Adjusted R Square	Std. Error	Durbin-Watson
	0.74	0.55	0.55	0.38	1.76

Predictors: (Constant), X1, X2, X3, X4, Dependent Variable: Y

4.5.4 Multicollinearity

Further to the reliability tests a multi-co linearity test was done to ensure that the accepted independent variables did not exhibit co linearity amongst themselves. A situation in which there is a high degree of association between independent variables is said to be a problem of multi-co linearity which results into large standard errors of the coefficients associated with the affected variables. According to Mugenda and Mugenda (2012), multi-co linearity can occur in multiple regression models in which some of the independent variables are significantly correlated among themselves. In a regression model that best fits the data, independent variables correlate highly with dependent variables but correlate, at most, minimally with each other. This problem was solved by ensuring that there was a large enough sample as multi-co linearity is not known to exist in large samples. Multi-co linearity can also be solved by deleting one of the highly correlated variables and re-computing the regression equation. The tolerances are all

above 0.2. If a variable has co linearity tolerance below 0.2, it implies that 80% of its variance is shared with some other independent variables. The variance inflation factors (VIFs) are also all below 5. The VIF is generally the inverse of the tolerance. Multi-co linearity is associated with VIF above 5 and tolerance below 0.2. Cohen, Cohen, West and Aiken (2013), provided that a VIF statistic above 5 is an indicator of multicollinearity and should be removed from regression models. The accepted variables were therefore determined not to exhibit multi-co linearity. Since the accepted variables did not exhibit multi co linearity, they were fit to be used for analysis. Table 4.16 presents results of multcolinearity.

Table.416: Multicollinearity results

Variable	Tolerance	VIF
1. E- Tendering practice	0.44	2.26
2. E- Order processing practice	0.46	2.16
3. E-Material management practice	0.48	2.07
4. E-Supplier management practice	0.52	1.91

4.5.5 Normality test

For one to fit a linear model to some given data, the variables have to be normally distributed (Ghasemi & Zahedias, 2012). In their study, Ali, Namusonge and Sakwa (2016), showed that the assumptions and application of statistical tools as well as suitability of the tests are important aspects for statistical analysis. Verified data inspire stakeholder confidence and give reliable inferences and trustworthy interpretations for policy making. To check for normality, the study adopted the One-sample Kolmogorov-Smirnov test.

Q-Q Plot

For data to be normally distributed, the observed values should be spread along the straight diagonal line. Since most of the observed values are spread very close to the straight line of all the variables of the study, there is high likelihood that the data are normally distributed. This finding is confirmed by the Q-Q plot tests in figure 4.1.

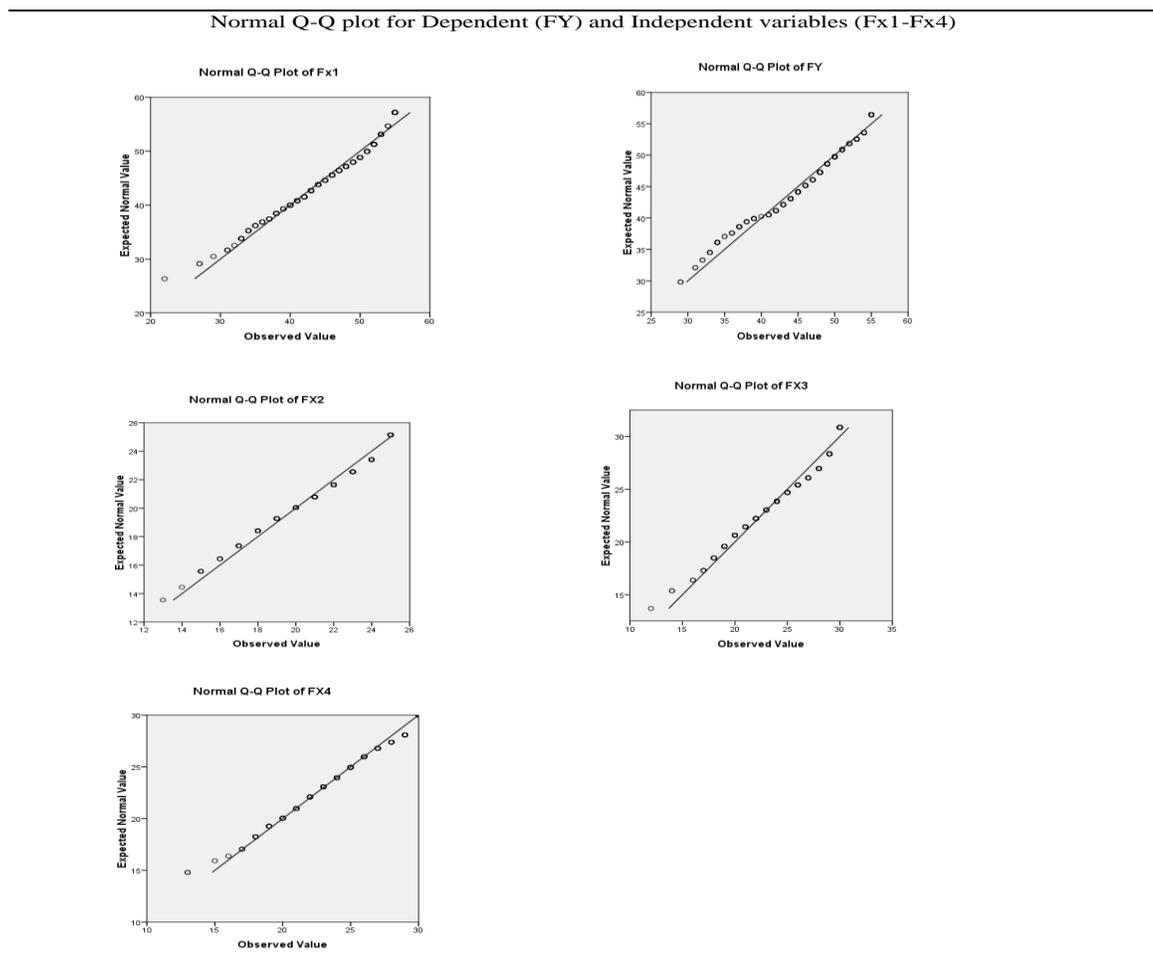


Figure 4.1: Normal Q-Q plot for Dependent (FY) and Independent variables (Fx1-Fx4)

Kolmogorov-Smirnov test

The Kolmogorov-Smirnov test is a non-parametric test that can be used to test the underlying distribution of a given random variable. This was used to test whether the dependent variable and independent variables followed a normal distribution. The Kolmogorov-Smirnov statistic for E-tendering is 1.383 has a p-value of 0.044, E-order processing is 2.052 has a p-value of 0.000, E-material management is 2.256 has a p-value of 0.046, E-supplier management is 1.372 has a p-value of 0.046 and supply chain performance is 1.485 has a p-value of 0.024. All the P-values are less than 0.05. With 95% confidence, the study concluded that the dependent variable and independent variables followed a normal distributed and hence fitting a linear model to the data was justified. Table 4.17 shows results of Kolmogorov-Smirnov test.

Table.4.17: One-Sample Kolmogorov-Smirnov Test

		E-tendering	E-order processing	E-material mgt	E-supplier mgt	SC performance
N		266	266	266	266	266
Normal Parameters ^a	Mean	45.1805	21.5075	25.0376	24.6053	46.1090
	Std. Deviation	6.66315	2.81538	4.01113	3.72222	6.18880
Most Extreme Differences	Absolute	.085	.126	.138	.084	.091
	Positive	.070	.107	.108	.074	.075
	Negative	-.085	-.126	-.138	-.084	-.091
Kolmogorov-Smirnov Z		1.383	2.052	2.256	1.372	1.485
Asymp. Sig. (2-tailed)		.044	.000	.000	.046	.024

a. Test distribution is Normal.

4.6 Inferential results

Inferential statistics was applied to reach conclusions that extend beyond the immediate data alone. The study used inferential statistics to try to infer from the sample data what the population might think to make judgments of the probability that an observed difference between groups is a dependable one or one that might have happened by chance in this study. Thus, inferential statistics was used to make inferences from the study data to more general conditions.

4.6.1 Pearson product correlation coefficient

The Pearson product-moment correlation coefficient was used measure of the strength of a linear association between the two variables (Independent and Dependent). The Pearson correlation coefficient, r , can take a range of values from +1 to -1. A value of 0 indicates that there is no association between the two variables. A value greater than 0 indicates a positive association; that is, as the value of one variable increases, so does the value of the other variable. A value less than 0 indicates a negative association; that is, as the value of one variable increases, the value of the other variable decreases.

a. Correlation analysis for electronic tendering practice

A Pearson product-moment correlation was run to determine the relationship between supply chain performance (dependent variable) and E-tendering practice (independent variable). There was a strong, positive correlation between supply chain performance and E-tendering practice, which was statistically significant ($r = .713, n = 266, p = .000$). These findings indicate that there is a positive linear relationship between supply chain performance and E-tendering practice, meaning that as e-tendering practice is improved, supply chain performance also improves. Electronic tendering is shown in Table 4.18.

The first Hypothesis postulated that,

H₀₁: E-tendering practice has no significant influence on supply chain performance of sugar firms in Kenya.

The results of multiple regressions, revealed that E-tendering has a beta value of $r = .713$ and $p = .000$. Since the p - value is less than < 0.05 , the null hypothesis was rejected as presented in table 4.18. It was then concluded that there is significant relationship between E-tendering practice and supply chain performance. The results concur with Ngeno and Kinoti (2017) study that concludes that electronic tendering has positive and significant influences on effective supply chain management process in energy sector in Kenya.

Table.4.18: Correlation for electronic tendering practice

variable	correlation	Supply chain performance	E-tendering practice
Supply chain performance	Pearson correlation	1	.713*
	Sig. (2-tailed)		.000
	N	266	266
E-tendering practice	Pearson correlation	.713*	1
	Sig. (2-tailed)	.000	
	N	266	266

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

b. Correlation analysis for electronic order processing practice

There is a strong, positive correlation between supply chain performance and E-order processing practice, which was statistically significant ($r = .633$, $n = 266$, $p = .000$). These findings indicate that there is a positive linear relationship between supply chain performance and E-order processing practice.

The second Hypothesis postulated that,

H₀₂: E-order processing practice has no significant influence on supply chain performance of sugar firms in Kenya.

The results of multiple regressions revealed that E- order processing has a beta value of $r = .633$, $p = .000$). Since the p - value is less than < 0.05), the null hypothesis was rejected. It was then concluded that there is significant relationship between E-order processing practice and supply chain performance as presented in table 4.19.

Table.4.19: Correlation for electronic order processing practice

Variable	correlation	Supply chain performance	E-order processing practice
Supply chain performance	Pearson correlation	1	.633*
	Sig. (2-tailed)		.000
	N	266	266
E-order processing practice	Pearson correlation	.633*	1
	Sig. (2-tailed)	.000	
	N	266	266

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

c. Correlation analysis for electronic material management practice

There is a strong, positive correlation between supply chain performance and E-material management practice, which was statistically significant ($r=.551$, $n = 266$, $p = .000$). These findings indicate that there is a positive linear relationship between supply chain performance and E-material management practice.

The third Hypothesis postulated that,

H₀₃: E-material management practice has no significant influence on supply chain performance of sugar firms in Kenya.

The results of multiple regressions revealed that E- material management has a beta value of $r=.551$, $p= .000$. Since the p- value is less than < 0.05 , the null hypothesis was rejected. It was then concluded that there is significant relationship between E-material management practice and supply chain performance as presented in table 4.20.

Table.4.20: Correlation for Material management practice

		Supply chain performance	E-material mgt practice
Supply chain performance	Pearson correlation	1	.551*
	Sig. (2-tailed)		.000
	N	266	266
E-material mgt practice	Pearson correlation	.551*	1
	Sig. (2-tailed)	.000	
	N	266	266

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

d. Correlation analysis for electronic supplier management practice

There is a strong, positive correlation between supply chain performance and E-supplier management practice, which was statistically significant ($r = .478$, $n = 266$, $p = .000$). These findings indicate that there is a positive linear relationship between supply chain performance and E-supplier management practice. All the independent variables have a p-value of 0.000 implying that they have a significant positive effect on the Supply Chain performance of sugar firms.

The fourth Hypothesis postulated that,

H₀₄: E-supplier management practice has no significant influence on supply chain performance of sugar firms in Kenya.

The results of multiple regressions revealed that E-Supplier management has a beta value of $r = .478, p = .000$. Since the p- value is less than < 0.05 , the null hypothesis was rejected. It was then concluded that there is significant relationship between E-supplier management practice and supply chain performance as presented in table 4.21.

Table.4.21: Correlation for E-material management practice

Variable	correlation	Supply chain performance	E-Supplier mgt practice
Supply chain performance	Pearson correlation	1	.478*
	Sig. (2-tailed)		.000
	N	266	266
E-Supplier mgt practice	Pearson correlation	.478*	1
	Sig. (2-tailed)	.000	
	N	266	266

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

4.6.2 Regression results

To establish the relationship between e-procurement practices and supply chain performance, a regression analysis was done using SPSS version 21 statistical packages to determine whether E-procurement system attributes, E-Tendering practice, E- order processing practice, E-material management practice and E-supplier management practice influence Supply chain performance in the sugar manufacturing firms.

a. Model summary electronic tendering practice

The model for the construct customer service was tested. The coefficient of determination and $R=0.713$ $R^2=0.508$ at 0.05 at significance level. The coefficient of Determination (R^2 Square) of 0.508 postulates that 50.8% of the procurement performance of the sugar processing firms can be attributed to electronic tendering practices they have adopted in their procurement processes. This shows that there existed a strong positive correlation coefficient between E-tendering and supply chain performance. The findings are as indicated in the table 4.22.

Table.4.22: Model summary E-tendering

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	0.713	0.508	0.506	0.395

a. Predictors: (Constant), E-tendering

b. Model summary electronic order processing practice

The model for the construct customer service was tested. The coefficient of determination and $R=0.633$ $R^2=0.401$ at 0.05 at significance level. The coefficient of Determination (R^2 Square) of 0.401 postulates that 40.1% of the procurement performance of the sugar processing firms can be attributed to the electronic order processing practices they have adopted in their procurement processes. This shows that there existed a positive correlation coefficient between E-order processing and supply chain performance. The findings are presented in table 4.23.

Table.4.23: Model summary E-order processing practice

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
a. Predictors: (Constant), E-order processing	0.633	0.401	0.399	0.436

c. Model summary electronic material management practice

The model for the construct customer service was tested. The coefficient of determination and $R=0.551$ $R^2=0.304$ at 0.05 at significance level. The coefficient of Determination (R^2 Square) of 0.304 postulates that 30.4% of the procurement performance of the sugar processing firms can be attributed to the electronic material management practices they have adopted in their procurement processes. This shows that there existed a positive correlation coefficient between E-material management and supply chain performance. The findings as indicated in table 4.24.

Table.4.24: Model summary E-material management practice

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
a. Predictors: (Constant), E-material management practice	0.551	0.304	0.301	0.471

d. Model summary for electronic supplier management practice

The model for the construct customer service was tested. The coefficient of determination and $R=0.478$ R Square= 0.229 at 0.05 at significance level. The coefficient of Determination (R^2 Square) of 0.229 postulates that 22.9% of the procurement performance of the sugar processing firms can be attributed to the electronic supplier management practices they have adopted in their procurement processes. This shows that there existed a positive correlation coefficient between E-supplier management and supply chain performance. The findings as indicated in table 4.25.

Table.4.25: Model summary E-supplier management practice

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	0.478	0.229	0.226	0.495
a. Predictors: (Constant), E-supplier management practice				

4.6.3 ANOVA

Analysis of variance (ANOVA) is a collection of statistical models used to analyze the differences among group means and their associated procedures (such as "variation" among and between groups), developed by statistician and evolutionary biologist Ronald Fisher in 1840s. In the ANOVA setting, the observed variance in a particular variable is partitioned into components attributable to different sources of variation.

a. ANOVA for electronic tendering practice

The probability value of 0.000 indicates that the regression relationship is highly significant in predicting how E-tendering affects supply chain performance of manufacturing organizations. The F calculated at 5% level of significance was 273.641 and since F calculated is greater than the F critical (value = 5.1922), this shows that the overall model is significant. Findings are shown in table 4.26.

Table.4.26: ANOVA for E-tendering

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	42.688	1	42.688	273.641	0.000
	Residual	41.291	264	.156		
	Total	83.979	265			

a. Predictors: (Constant), E-tendering

b. Dependent Variable: Y

b ANOVA for electronic order processing practice

The probability value of 0.000 indicates that the regression relationship is highly significant in predicting how E-order processing affects supply chain performance of sugar firms. The F calculated at 5% level of significance was 176.314 and since F calculated is greater than the F critical (value = 5.1922), this shows that the overall model is significant. Table 4.27 shows the findings.

Table.4.27: ANOVA for E-order processing practice

	Sum of Squares	df	Mean Square	F	Sig.
Regression	33.676	1	33.676	176.31	.000
Residual	50.300	264	0.191		
Total	83.979	265			

a. Predictors: (Constant), E-order processing

b. Dependent Variable: Y

c. ANOVA for electronic material management practice

The probability value of 0.000 indicates that the regression relationship is highly significant in predicting how E-material management affects supply chain performance of sugar firms. The F calculated at 5% level of significance was 115.425 and since F calculated is greater than the F critical (value = 5.1922), this shows that the overall model is significant. The finding of electronic material management are shown in table 4.28.

Table.4.28: ANOVA for E-material management practice

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	25.509	1	25.509	115.425	.000
	Residual	58.470	264	0.221		
	Total	83.979	265			

a. Predictors: Constant, E-material

b. Dependent: Y

d. ANOVA for electronic supplier management practice

The probability value of 0.000 indicates that the regression relationship is highly significant in predicting how E-supplier management affects supply chain performance of sugar firms. The F calculated at 5% level of significance was 78.469 and since F calculated is greater than the F critical (value = 5.1922), this shows that the overall model is significant as shown in table 2.29.

Table.4.29: ANOVA for E-supplier management practice

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	19.225	1	19.225	78.469	0.000
	Residual	64.754	264	.245		
	Total	83.979	265			

a. Predictors: Constant, X4, Y

4.6.4 Regression

A regression model was used in this analysis. The resulting regression coefficients have been used to interpret the direction and magnitude of the relationship. The β coefficients show the responsiveness of the dependent variable as a result of unit change in each of the independent variables (E-procurement practices). The error term ϵ captures the variations that cannot be explained by the model.

a. Regression for electronic tendering practice

As indicated by the p-value (p=0.000), both the constant and independent variable (E-tendering) contribute significantly to the model. The regression model is presented as

follows; Supply chain Performance = 1.473 +0.662 (E-tendering). The regression model has established that supply chain performance will equal to 1.473 when e-tendering equal to zero. Supply chain performance is predicted to improve by 0.662 when E-tendering goes up by one unit. At 5% level of significance and 95% level of confidence, E-tendering practice had p-value of 0.000 level of significance indicating that E-tendering is statistically significant ($p < 0.05$). The predictor (E-tendering) has a low p-value hence it is likely to be a meaningful addition to the model because changes in the predictor's value are related to changes in the response variable. Table 4:30 provides the information of E-tendering.

Table.4.30: Regression for E-tendering practice

Model 1	Unstandardized Coefficients	Std. Error	Standardized Coefficients Beta	t	Sig.
(Constant)	1.473	0.166		8.853	.000
E-tendering	0.662	0.040	0.713	16.521	.000

Dependent Variable:SCM

b. Regression for electronic order processing practice

Both the constant and E-order processing practice contribute significantly to the model. The regression equation is presented as follows; Supply chain Performance = 1.468 +0.633 (E-order processing). The regression model has established that supply chain performance will equal to 1.468 when e-order processing equal to zero. The finding presented in table 4.31 also show that supply chain performance is predicted to improve by 0.633 when E-order processing goes up by one unit. At 5% level of significance and 95% level of confidence, E-order processing practice had p-value of 0.000 level of

significance indicating that E-order processing is statistically significant ($p < 0.05$). The predictor (E-order processing) has a low p-value hence it is likely to be a meaningful addition to the model because changes in the predictor's value are related to changes in the response variable. Table 4:31 provides the information of E-order processing.

Table.4.31: Regression for E-order processing practice

	Unstandardized Coefficients	Std. Error	Standardized Coefficients Beta	t	Sig.
Model 1					
(Constant)	1.468	0.207		7.106	.000
E-order processing	0.633	0.048	0.633	13.295	.000

a. Dependent Variable:
Supply chain performance

c. Regression for electronic material management practice

The regression equation is presented as follows; Supply chain Performance = 2.255 +0.464 (E-material management).The regression model has established that supply chain performance will equal to 2.255 when e-order material management equal to zero. Supply chain performance is predicted to improve by 0.464 when E-material management goes up by one unit. At 5% level of significance and 95% level of confidence, e- material management practice had p-value of 0.000 level of significance indicating that E-material management is statistically significant ($p < 0.05$). The predictor (E-material management) has a low p-value hence it is likely to be a meaningful addition to the model because changes in the predictor's value are related to changes in the response variable. Table 4:32 provides the information of E-material management.

Table.4.32: Regression for E-material management practice

	Unstandardized Coefficients	Std. Error	Standardized Coefficients Beta	t	Sig.
Model 1					
(Constant)	2.255	0.183		12.336	
E-Material management		0.043	.0551	10.732	.000

a. Dependent: SCP

d. Regression for electronic supplier management practice

The regression equation is presented as follows; Supply chain Performance = 2.410 +0.434 (E-supplier management). The regression model has established that supply chain performance will equal to 2.410 when e-order processing equal to zero. The finding presented in table 4.33 also show that supply chain performance is predicted to improve by 0.434 when E-order processing goes up by one unit. At 5% level of significance and 95% level of confidence, E-supplier management practice had p-value of 0.000 level of significance indicating that E-supplier management is statistically significant ($p < 0.05$). The predictor (E-supplier management) has a low p-value hence it is likely to be a meaningful addition to the model because changes in the predictor's value are related to changes in the response variable. Table 4:33 provides the information of e-supplier management.

Table.4.33: Regression for E-supplier management practice

	Unstandardized Coefficients	Std. Error	Standardized Coefficients Beta	t	Sig.
Model 1					
(Constant)	2.410	0.203		11.843	.000
E-supplier management	0.434	0.049	.0478	8.853	.000

a. Dependent Variable: Supply chain performance

4.6.5 Pearson product correlation matrix

The Pearson product-moment correlation coefficient was used as a measure of the strength of a linear association between the two variables (Independent and Dependent). The Pearson correlation coefficient, r , can take a range of values from +1 to -1. A value of 0 indicates that there is no association between the two variables. A value greater than 0 indicates a positive association; that is, as the value of one variable increases, so does the value of the other variable. A value less than 0 indicates a negative association; that is, as the value of one variable increases, the value of the other variable decreases. A Pearson product-moment correlation was run to determine the relationship between supply chain performance (dependent variable) and E-procurement practices (independent variables).

There is a positive strong relationship between the E-Procurement practices and Supply Chain performance. There is a strong, positive correlation between supply chain performance and E-tendering practice, which was statistically significant ($r = .713, n = 266, p = .000$). These findings indicate that there is a positive linear relationship between supply chain performance and E-tendering practice, meaning that as e-tendering practice is improved, supply chain performance also improves. There is a strong, positive correlation between supply chain performance and E-order processing practice, which was statistically significant ($r = .633, n = 266, p = .000$). These findings indicate that there is a positive linear relationship between supply chain performance and E-order processing practice. There is a strong, positive correlation between supply chain performance and E-material management practice, which was statistically significant ($r = .551, n = 266, p = .000$).

These findings indicate that there is a positive linear relationship between supply chain performance and E-material management practice. There is a strong, positive correlation between supply chain performance and E-supplier management practice, which was statistically significant ($r = .478, n = 266, p = .000$). These findings indicate that there is

a positive linear relationship between supply chain performance and E-supplier management practice. All the independent variables have a p-value of 0.000 implying that they have a significant positive effect on the Supply Chain performance of sugar firms. Correlation results is shown in Table 4.34.

Table.4.34: Correlation matrix

Variable		SCP	E-tendering	E-order processing	E-material Mgt	E-supplier Mgt
SCP	Pearson Correlation	1	.713**	.633**	.551**	.478**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	266	266	266	266	266
E-Tendering	Pearson Correlation	.713**	1	.682**	.635**	.567**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	266	266	266	266	266
E-ordering	Pearson Correlation	.633**	.682**	1	.584**	.591**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	266	266	266	266	266
E-material mgt	Pearson Correlation	.551**	.635**	.584**	1	.626**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	266	266	266	266	266
E-supplier mgt	Pearson Correlation	.478**	.567**	.591**	.626**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	266	266	266	266	266

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

4.6.6 Overall model

Multiple regression analysis was used to determine whether independent variables; E-tendering practice (X1), E-order processing practice (X2), E-material management practice (X3) and E-supplier management practice (X4) simultaneously affect the dependent variable Y which is supply chain performance. The sub-section examines whether the multiple regression equation can be used to explain the hypothesis of the influence of e-procurement practices in enhancing supply chain performance in sugar firms in Kenya.

The model of supply chain performance with the coefficient of determination $R = .0.745$ and $R^2 = 0.554$ at 0.05 significant level. The results indicate that there is a very strong positive relationship ($R=0.745$) between the dependent variable (E-procurement practices) and the independent variables (E-Tendering practice, E- order processing practice, E-material management practice and E-supplier management practice). The coefficient of Multiple Determination (R2 Square) of 0.554 postulates that 55.4% of the procurement performance of the sugar processing firms can be attributed to the electronic procurement practices sugar processing firms have adopted in their procurement processes as explained by the combined effort of independent variables of the study which comprise of E-Tendering practice, E- order processing practice, E-material management practice and E-supplier management practice. The results of the model summary are represented in table 4.35.

Table.4.35: Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.745	0.554	0.548	4.162

a. Predictors: (Constant), X1, X2, X3, X4

The regression and residual (Error) Sum of squares. The variance of the residuals (or errors) is the value of the mean square which is 1407.010. The predictors X1-X4 represents the independent variables, which are the factors influencing supply chain performance. The data to compute R² which is the sum of squares-regression divided by sum of squares total R squared. SS-regression/SS-total, that is 5628.039/4 = 1407.010. The summary of ANOVA and F-statistic which reveals the value of F (81.213) is significant at 0.05 confidence level. The value of F is large enough to conclude that the set independent variables X1-X4 influence supply chain performance of sugar processing firms in Kenya. The results are shown in Table 4.36.

Table.4.36: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5628.039	4	1407.010	81.213	.000
	Residual	4521.800	261	17.325		
	Total	10149.838	265			

a. Predictors: (Constant),

X1, X2, X3, X4

b. Dependent: Y

In estimating the contribution of each independent variable of the study, it was established that all independent variables significantly contributed to variance of e-procurement practice at significant level of 0.05. However, the relative importance of each independent variable(s) is different. The regression equation has established that supply chain performance will be 10.411 when E-tendering practice, E-ordering practice, E-material management practice and E-supplier management practice equal to zero. The findings presented also show supply chain performance is predicated to improve by 0.446 when the E-tendering practice variable goes up by one, 0.546 when E-order processing practice goes up by one, 0.161 when E-material management practice

goes up by one and decrease by 0.010 when E-supplier management practice goes up by one. The negative results for E-supplier management practice on supply chain performance can be justified because most suppliers are not connected to the sugar firms' electronic procurement platform and hence they are not practicing E-procurement therefore additional of any supplier not practicing e-procurement lowers supply chain performance due to delayed information on the state and progress procurement process which will affect deliveries. At 5% level of significance and 95% level of confidence E-tendering practice, E-ordering practice, E-material management practice and E-supplier management practice had a 0.000, 0.000, 0.036 and 0.047 respectively level of significance showing that the independent variables X1, X2, X3 and X4 are significant ($p < 0.05$). Variance inflation factor (VIF) which measure how much the variance of the estimated coefficients are increased over the case of number of correlations among the X variables. The VIF is generally the inverse of the tolerance. Multi-co linearity is associated with VIF above 5 and tolerance below 0.2. Cohen, Cohen, West and Aiken (2013), provided that a VIF statistic above 5 is an indicator of multicollinearity and should be removed from regression models. The accepted variables were therefore determined not to exhibit multi-colinearity. Since the accepted variables did not exhibit multi co linearity ($VIF < 5$ and tolerance above 0.2), they were fit to be used for analysis. Table 4.37 presents the standardized coefficients of correlation (Beta).

Table.4.37: Coefficients

Model	coefficients						
	Unstandardized Coefficients	Std. Error	Standardized Coefficients Beta	t	Sig.	Collinearity Statistics	
						Tolerance	VIF
Constant	10.411	2.122		4.906	0.000		
E-tendering	0.446	0.058	0.480	7.733	0.000	0.442	2.261
E-order processing	0.546	0.133	0.249	4.096	0.000	0.463	2.158
E-material mgt	0.161	0.092	0.104	1.753	0.036	0.482	2.075
E-supplier mgt	-0.010	0.095	0.006	-0.104	0.047	0.522	1.916

a. Dependent variable, Y

The regression equation $Y = 10.411 + 0.446X_1 + 0.546X_2 + 0.161X_3 - 0.010X_4$

Where: Y = Supply chain performance (value of dependent variable),

$B_0 - \beta_4$ = estimated regression coefficient

X_1 = E-Tendering practice

X_2 = E-order processing practice

X_3 = E-material management practice

X_4 = E-supplier management practice

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the findings from the study, the conclusions that have been arrived at, the recommendations made by the researcher based on the findings and suggestions on the areas the researcher felt may require further investigation through research activity.

5.2 Summary

The study established that E-tendering processing practice enhances supply chain performance, majority 95.1% were of the view that E-tendering practice enhances supply chain performance while 4.9% had a contrary view. It was also established that E-tendering practice reduces tender processing time, eliminates postal, printing & storage costs, suppliers are able to access tenders/quotation/requests any time anywhere in the world, alteration of tender documents is impossible or easy to detect, neither party can deny sending or receiving documents, provides fairness to all regardless of geographic location of a supplier and it improves audit trails to a large extent. While other respondents indicated that tender documents cannot be accessed by unauthorized person, ability to eliminate non-compliant bids automatically reduces corruption and Computer/network malfunctions can affect bid submission to a moderate extent.

The study found out that E-order processing practice enhances supply chain performance, majority 98.1% were of the view that E-ordering practice enhances supply chain performance while 1.9% had a contrary view. E- order processing practice reduces order processing time, reduces paperwork thus reduced costs, reduces human errors, assists to monitor order due dates and electronic invoice payment improves supplier relationship.

From the study established that E-material management practice enhances supply chain performance, majority 97.7% were of the view that E-ordering practice enhances supply chain performance while 2.3% had a contrary view. To a large extent E-material management practice affects supply chain performance in that real-time stock levels enable inventory manager to quickly see which products have reached re-order level, Inventory levels in each warehouse is accessible to management, enables count of inventory throughout the supply chain, minimizes inventory carrying costs as electronic information enables better decisions on reorder quantities and visibility of product availability is critical to efficient operations. Some respondents indicated that by use of Bar codes store's inventory can be automatically adjusted to account for items leaving the store affects procurement performance to a moderate extent.

The study found out that E-supplier management practice enhances supply chain performance, majority 95.9% were of the view that E-ordering practice enhances supply chain performance while 4.1% had a contrary view. To a large extent buyers and suppliers develop a single shared forecast of demand and a plan of supply, buyers issue order of materials from the suppliers is streamlined, quick information sharing with suppliers, predictability of flow of goods, electronic payment to suppliers improve delivery and improved relations with channel partners.

The overall objective of the study was to establish the influence of E-procurement practices on supply chain performance of the sugar firms in Kenya. The study established that E-procurement practices enhances supply chain performance, majority 98.1% were of the view that E-procurement practices enhances supply chain performance while 1.9% had a contrary view. To a large extent the application of E-procurement practices reduced purchasing costs, improved efficiency and time taken to complete procurement process, standardized purchasing process across the organization, reduced administrative cost with better effectiveness, improved effectiveness of SC processes, reduced discretion & increases transparency, reduced discretion and increased transparency, improved SC managers decision making and reduced errors of order

transmission. Respondents also indicated that E-procurement practices reduced procurement corruption and inventory to a moderate extent.

5.3 Conclusions

The study concluded that there is significant relationship between E-tendering practices and supply chain performance with $r = 0.713$, $p = 0.000$. Since p value, 0.000 is < 0.05 , the null hypothesis was rejected. Hence E-tendering processing practice enhances supply chain performance and E-tendering practice reduces tender processing time, eliminates postal, printing & storage costs, suppliers are able to access tenders/quotation/requests any time anywhere in the world, alteration of tender documents is impossible or easy to detect, neither party can deny sending or receiving documents, provides fairness to all regardless of geographic location of a supplier and it improves audit trails to a large extent.

It was concluded that there is significant relationship between E-ordering practice and supply chain performance as per results of $r = 0.633$, $p = 0.000$. Since p value, 0.000 is < 0.05 , the null hypothesis was rejected. Therefore, E-order processing practice enhances supply chain performance as it reduces order processing time, reduces paperwork thus reduced costs, reduces human errors, assists to monitor order due dates and electronic invoice payment improves supplier relationship.

It was concluded that there is significant relationship between E-material management practice and supply chain performance with $r = 0.551$, $p = 0.000$. Since p value, 0.000 is < 0.05 , the null hypothesis was rejected. Hence E-material management practice enhances supply chain performance in that real-time stock levels enable inventory manager to quickly see which products have reached re-order level, inventory manager knows how much inventory is in each warehouse, enables count of inventory throughout the supply chain, minimizes inventory carrying costs as electronic information enables better decisions on reorder quantities and visibility of product availability is critical to efficient operations.

It was concluded that there is significant relationship between E-supplier practice and supply chain performance with $r= 0.478$, $p = 0.000$. Since p value, 0.000 is < 0.05 , the null hypothesis was rejected. Therefore, E-supplier management practice enhances supply chain performance as buyers and suppliers develop a single shared forecast of demand and a plan of supply, buyers issue order of materials from the suppliers is streamlined, quick information sharing with suppliers, predictability of flow of goods, electronic payment to suppliers improve delivery and improved relations with channel partners.

The study established that there is a positive relationship between the E-Procurement practices and Supply Chain performance evident from the positive correlation coefficient of 0.713 for E- tendering. The next most critical variable is E-order processing practice with a positive correlation coefficient of 0.633 . E-material management practice is also positively correlated with a correlation coefficient of 0.551 and E-supplier management practice is positively correlated with a correlation coefficient of 0.478 . All the independent variables have a p -value of 0.000 implying that they have a significant effect on the Supply Chain performance of sugar firms. Therefore, E-procurement practices enhance supply chain performance. the application of E-procurement practices reduces purchasing costs, improves efficiency and time taken to complete procurement process, standardizes purchasing process across the organization, reduces administrative cost with better effectiveness, improves effectiveness of SC processes, reduces discretion & increases transparency, reduces discretion and increases transparency, improves SC managers decision making and reduces errors of order transmission.

5.4 Recommendations

5.4.1 Managerial recommendations

The study established that E-tendering processing practice enhances supply chain performance positive. It is recommended that management should ensure that all modules from purchasing Requisition, Quotation/tenders, request for proposals, purchasing order approvals and Transmission, contract monitoring, Goods receipt note. This will reduce tender processing time, eliminate postal, printing & storage costs, wide supplier base will be achieved and audit trails will be maintained thus reduction of corruption.

The study also found out that E-order processing practice enhances supply chain performance. It is recommended that in order to achieve maximum benefits of reduced order processing time, reduced costs, reduced human errors and improved delivery, management should enhance electronic system and insist on all orders being processed electronically.

From the study established that E-material management practice enhanced supply chain performance by Stocks being managed by application of MRP, EOQ, stock aging, stock location, receiving, issuing stocks and stock reports electronically. It is recommended that application of Bar codes should be improved to improve receipts and issues of stocks.

The findings were that E-supplier management practice enhanced supply chain performance. It is recommended that management should ensure working Websites, working internal and External mail to improve supplier and buyers integration. To improve buyer/supplier relationship in time electronic payment to suppliers is necessary.

5.4.2 Policy recommendations

The Government through the relevant ministry should institute policies concerning data handing to enhance the application of electronic procurement practices between the buyers and suppliers. This will improve the electronic payment, and use of electronic signature acceptance. Further the firms should provide the supplier with access credentials for the supplier portal. This will increase user's access to information in the electronic procurement process with effective internet and thus an increase in chances of selecting the best supplier company for electronic tendering.

5.5 Areas for Further Research

The study recommends further research to document findings on the achievements of electronic tendering system to firms, electronic order processing, electronic material management and electronic supplier management. This should cover issues such as cost, time quality and corruption. Researchers to apply various measuring methods in order to fully track and understand how benefits are distributed. The study recommends a study to find out the reasons why some of these companies have not incorporated all the procurement activities in E-procurement. A comparative study will be critical in order to establish whether there are any similarities or differences in the factors leading to success of E-procurement across different industries such as between private and public firms and between manufacturing industry and another industry. Further research is recommended to look into effect of outsourcing purchasing functions.

REFERENCE

- Akkermans, H., Bogerd, P., & Vos, B. (1999). Virtuous and vicious cycles on the road towards international supply chain management. *International Journal of Operations & Production Management*, 19(5/6), 565-582.
- Ali, A., Namusonge, G., & Sakwa, M. (2016). Effect of Firm Managerial Risk Aversion on Corporate Hedging of Listed Firms in Nairobi Securities Exchange in Kenya. *IJRDO–Journal of Business Management*, 2(7), 45-64.
- Amayi, F.K. (2011). *Factors Affecting Procurement in the Public Service: a Case Study of the State Law Office*. Eldoret: Moi University.
- Amit, R., & Zott, C. (2001). Value creation in e-business. *Strategic management journal*, 22(6-7), 493-520.
- Amstrong, J. (2012). Illusions in regression analysis, *International Journal of Forecasting*, 2012(3), 689-694.
- Angeles, R. (2005). RFID technologies: supply-chain applications and implementation issues. *Information systems management*, 22(1), 51-65.
- Angeles, R., & Nath, R. (2000). An empirical study of EDI trading partner selection criteria in customer-supplier relationships. *Information & Management*, 37(5), 241-255.
- Authority, P. P. (2009). The long term policy framework for public procurement in Kenya, Draft zero. *Nairobi, Kenya*.
- Awino, B. (2007). *The Effect of Selected Strategy Variables on Corporate Performance: A Survey of supply chain management in large private Manufacturing firms in Kenya*. Unpublished PhD Thesis, Nairobi: University of Nairobi.

- Baily, P. J. H. (2008). *Procurement principles and management*, Harlow, England: Prentice Hall Financial Times.
- Barngetuny, D. & Kimutai, G. (2015). Effects of e-procurement on supply chain management performance in Elgeyo-Marakwet County. *International Academic Journal of Procurement and Supply Chain Management*, 1(5), 99-120.
- Basheka, B., Oluka, P. & Mugurusi, G. (2012). Adopting new approaches for public procurement efficiency: critical success factors (CSFs) for the implementation of e-procurement in Uganda's public sector, *International Journal of Procurement Management*, 5(6), 712–732.
- Bernard, H.R. (2002). *Research Methods in Anthropology: Qualitative and quantitative methods*. (3rd edition). Walnut Creek, California: Alta Mira Press.
- Bilali, J & Bwisa, H. (2015). Factors influencing the Adoption of e-Procurement: A case of Garissa County Government. *The Strategic Journal of Business and Change Management*, 6.
- Bolo, A. Z. (2011). An empirical investigation of selected strategy variables on firms performance: A study of supply chain management in large private manufacturing firms in Kenya. *Journal of Public Administration and Policy Research*, 3(8), 228-236.
- Bowersox, D.J., Closs, D.J., & Cooper, M.B. (2007). *Supply Chain Logistics Management*. New York: Longman.
- Brains, C., Willnat, L., Manheim, J., Rich, R. (2011), *Empirical Political Analysis* (8th edition). Boston, MA: Longman.

- Brandon-Jones, A. & Carey, S. (2011). The impact of user-perceived e-procurement quality on system and contract compliance', *International Journal of Operations and Production*, 45-48
- Centobelli, P & Cerchione, R. (2014). E-procurement and E-supply Chain: Features and Development of E-collaboration. *International Conference on Future Software Engineering and Multimedia Engineering*. (2014)
- Chartered Institute of Purchasing and Supply, (2011). <http://www.cips.com/>
- Chau, P. Y. K. (1996). An Empirical Assessment of a Modified Technology Acceptance Model. *Journal of Management Information Systems*, 13(2), 185-204.
- Chegugu, N. R. & Yusuf, K. G. (2017). Effect of electronic procurement practices on organizational performance in public hospitals in the county government of Uasin Gishu, Kenya. *International Academic Journal of Procurement and Supply Chain Management*, 2(3), 16-32.
- Chirchir, E. (2015). Relationship between E-procurement Adoption and Partnership Practice in Tea Firms, *The International Journal of Business and Management*, 8.
- Chopra, S, Meindl, P, & Kalra, D. (2010). *Supply chain management*. Noida: Pearson Education.
- Christensen, T., & Lægreid, P. (2007). *Transcending New Public Management: The Transformation of Public Sector Reforms*. Burlington, VT: Ashgate Publishing Company.
- Christian, T., Ralf, W., & Michael, Q., (2006). The role of information technology in procurement in the Top 200 companies in Switzerland, *Competence Center*

E-Business Basel at the University of Applied Sciences Northwestern Switzerland – FHNW.

Christopher, M. (1992). *Logistics and Supply Chain Management*. London: Pitman Publishing.

Coase, R. (1988). Lecture on the Nature of the Firm, 111'. *Journal of Law, Economics and Organization*, 4, 33-47.

Cohen, J., Cohen, P., West, S.G., & Aiken, L.S. (2013). *Applied multiple regression /correlation analysis for the behavioral sciences*. (3rd ed.).New York: Routledge.

Cohen, L., Manion, L., Morrison, K, & Morrison, R.B. (2007). *Research methods in education*, New York: Routledge.

Collis, J. & Hussey, R. (2014). *Business Research: A Practical Guide for Undergraduate and Postgraduate Students*, (4th edition), Palgrave: Macmillan.

Cootner P.H. (1964). *The Random Character of Stock Market Prices*. London: MIT Press.

Creswell, J.W. (2013). *Research design: Qualitative, Quantitative, and mixed methods Approaches*, (4th ed.), London: Sage Publications

Croom, S.R., & Johnston, R. (2003). E-service: enhancing internal customer service through e-procurement. *International Journal of Service Industry Management*, 14(5), 539-555.

- Croom, S.R., (2005). The impact of e-business on supply chain management: an empirical study of key developments. *International Journal of Operations and Production Management*, 25(1), 55-73.
- Dai and Kauffman, (2001). *Electronic commerce: a managerial perspective*, New Jersey: Person Education, Inc.
- Davila, A., Gupta, M., & Palmer, R. (2003). Moving Procurement Systems to the Internet: The Adoption and Use of E-Procurement Technology Models, *European Management Journal*, 21(1), 11-23.
- Davila, A., Gupta, M., & Palmer, R. J. (2002). Moving Procurement systems to the internet: The Adoption and Use of E-Procurement Technologies Models. *European Management Journal*, 21(1), 25-33
- Davis, F. D. (1986). *A technology acceptance model for empirically testing new end user information systems: theory and results*, Unpublished PhD. dissertation. Cambridge, MA: MIT Sloan School of Management.
- Dolmetsch, R., Fleisch, E. & Österle, H. (2000). Electronic Commerce in the Procurement of Indirect Goods, in: Österle, H., Fleisch, E. and Alt, R., Business Networking: Shaping Collaboration Between Enterprises, Springer, Berlin etc., pp 193-209, electronic procurement', *European Journal of Purchasing and Supply Management*, 8(1), 25–33.
- Dolmetsch, R., Fleisch, E., & Osterle, H. (2000). *Electronic commerce in the procurement of indirect goods*. New York: Springer.
- Donaldson, L., (2001). *The Contingency Theory of Organizations*, Thousand Oaks: Sage.

- Dyer, J. H. & Singh, H. (1998). The Relational View: Cooperative Strategy and Sources of Inter-organizational Competitive Advantage. *Academy of Management Review*, 23, 660-679.
- Egbu, C. Vines, M. & Tookey, J. (2004). The Role of Knowledge Management in E-Procurement initiatives for Construction Organisations, Proceedings of ARCOM Twentieth Annual Conference 2004, September 1-3, Heriot Watt University, (Khosrowshami, F Editor), Vol. 1, Arcom, University of Reading, Reading, 661 –671.
- Fama, Eugene (1965). "The Behavior of Stock Market Prices". *Journal of Business*, 38, 34–105.
- Fama, Eugene (1970). "Efficient Capital Markets: A Review of Theory and Empirical Work. *Journal of Finance*, 25(2), 383–417.
- Fernandes, T. & Vieira, V. (2015). 'Public e-procurement impacts in small- and medium-enterprises', *Int. J. Procurement Management*, 8(5), .587–607.
- Fiedler, F.E. (1964). A contingency model of leadership effectiveness. *Advanced Experimental Social Psychology*, 1, 149-190.
- Flynn, B.B., Huo, B. & Zhao, X. (2010). The Impact of Supply Chain Integration on Performance: A Contingency and Configuration Approach. *Journal of Operations Management*, 28, 58-71.
- Gitahi, L. (2011). Exceptional Customer Relationship is the Key to Our Success Nation Builder Newsletter.
- Global Agricultural Information Network (2017). *Kenya Annual Sugar Report*, Nairobi: GAIN.

- Handfield, R.B., & Nichols, Jr., (1999). *Introduction to Supply Chain Management*, New Jersey: Prentice- Hall.
- Hashim, N., Said, I., & Idris, N. H. (2013). Exploring e-procurement value for construction companies in Malaysia. *Procedia Technology*, 9, 836-845.
- Hausman, W.H. (2017). *Supply Chain Performance Metrics. In: The Practice of Supply Chain Management: Where Theory and Application Converge*. International Series in Operations Research and Management Science, vol 62. Springer, 2017, Boston, MA
- Hawking, P., Stein, A., Wyld, D. C., & Foster, S. (2004). E-procurement: is the ugly duckling actually a swan down under? *Asia Pacific Journal of Marketing and Logistics*, 16(1), 3-26.
- Hennig-Thurau, T., Malthouse, E. C., Friege, C., Gensler, S., Lobschat, L., Rangaswamy, A., & Skiera, B. (2010). The impact of new media on customer relationships. *Journal of service research*, 13(3), 311-330.
- Hitt, M. A., Nixon, R. D., Clifford, P. G. & Coyne, K. (1999). The Development and Use of Strategic Resources. In Hitt, M. A., Clifford, P. G., Nixon, R. D. and Coyne, K. P. (Eds.) *Dynamic Strategic Resources: Development, Diffusion, and Integration* (pp. 1-15). New York: Wiley.
- Hsin Chang, H., Tsai, Y. C., & Hsu, C. H. (2013). E-procurement and supply chain performance. *Supply Chain Management: An International Journal*, 18(1), 34-51.
- Hunja, R. (2014). E-Procurement: Opportunities & Challenges. *The electronic journal of information systems in developing countries*, 18(1), 1-24

- Irene, A., Osei, A., Prince, A., Duah, H., Anita, O., AnokyeOkofu, A. (2014). Christian, *European Journal of Business and Social Sciences*, 2(12), 71-88.
- Jessop, B. (2006). *Principals of Management*, (8th Edition), New Dehli, India: Mc Graw Hill Publishing Company Ltd.
- Johnson, R. B., & Christensen, L. B. (2014). *Educational research: quantitative, qualitative, and mixed approaches* (5th ed.). Los Angeles, CA: Sage.
- Juma, M.J. (2010). *Lead from where you are: Quarterly PPO Bulletin* (4)1. Nairobi: A publication of Non-Governmental Organizations Procurement Oversight Authority.
- Kadima, Z. R., Douglas, M., Kibet, Y., & Manase, G. W. (2013). An Analysis of Procurement Procedures on the Implementation of Government Construction Projects in Kenyan Public Universities: Case Study of Masinde Muliro University. 1st JKUAT-SHRD Research Conference, 12th -13th, September.
- Kaliannan, M., Awang, H. and Raman, M. (2009) 'Electronic procurement: a case study of Malaysia's e-perolehan (e-procurement) initiative', *International Journal of Electronic Governance*, Vol. 2, Nos. 2-3, pp.103-117
- Kalin, S., (2000). Trading Places, CIO Magazine Retrieved from: http://www2.cio.com/archive/021500-trading_content.html 5/11/2000, pgs.7
- Kamel, S. (2014). Sherif Kamel, ICT4D – Case of the Information Society in Africa. a proposed article submitted for review for possible publication. Encyclopedia of Information Science and Technology
- Karthik, V. & Kumar, S. (2013). Investigating 'degree of adoption' effects on e-procurement benefits, *International Journal of Procurement Management*, 6(2), 211-232.

- Kenya National Assembly, (2015). Report of the Departmental Committee on Agriculture, Livestock and Co-operatives on the Crisis Facing the Sugar Industry in Kenya.
- Kenya National Bureau of Statistics (KNBS) and Communications Authority (CA), (2017). *Kenya Public Sector ICT Survey 2017, a statistical report*, Nairobi: Kenya National Bureau of Statistics (KNBS) and the Communications Authority (CA).
- Kenya Sugar Directorate, (2014). *Kenya sugar industry, Strategic plan, 2010–2014*, Nairobi: Kenya Sugar Directorate.
- Kenya Sugar Directorate, (2017). *Kenya sugar industry Report*, Nairobi: Kenya Sugar Directorate.
- Kepher, A., Shalle, I. & Oduma, E. (2015). Role of Supplier Management on Procurement Performance in Manufacturing Sector in Kenya: A Case of East African Breweries, Kenya. *International Journal of Social Science and Humanities Research*, 3(4), 540-555.
- Khanapuri, V. B., Nayak, S. Soni, P., Sharma, S. & Soni, M. (2011). Framework to Overcome Challenges of Adoption of E-procurement in Indian Context, International Conference on Technology and Business Management March 28-30, 208
- Kiage, O.K., (2013). Factors affecting procurement performance. A case of Ministry of Energy, *International Journal of Business and Commerce*, 3(1), 54-70.
- Kioko, M. M., & Mwangangi, P. (2017). INFLUENCE OF E-PROCUREMENT ON PERFORMANCE OF PARASTATALS IN KENYA. *International Journal of Supply Chain and Logistics*, 1(3), 19-45.

- Koorn, R., Smith, D. & Mueller, C. (2001). *E-Procurement and Online market places*. Amsterdam, The Netherlands: Compact
- Kraljic, P. (1983). Purchasing must become supply management, *Harvard Business Review*, September-October, 109-118.
- Kumar, K., & Dissel, H., (1996). Sustainable Collaboration: Managing Conflict and Cooperation in Inter-organizational. Systems, *MIS Quarterly*, Minneapolis, 20(3), 279-300.
- Kumar, R., & Crook, C. W. (1996). Educating senior management on the strategic benefits of electronic data interchange. *Journal of Systems Management*, 47(2), 42.
- Lamming, R. (1995). *Strategic Procurement Management in the 1990s: Concepts and Cases*, Chartered Institute of Purchasing and Supply, Stamford (CT): Earlsgate Press.
- Lear-Olimpi, M., (1999). Get in step for the future. *Warehousing Management*, 6, 15.
- Lee, H. & Wong, S. (2001). *Supply chain integration over the internet*. Stanford: Stanford University.
- Lee, H., So, K., & Tang, C., (2000). The Value of Information Sharing in a Two-level Supply Chain, *Management Science*, 46(5), 626-643.
- Lee, S., & Leifer, R., (1992). A Framework for Linking the Structure of Information Systems with Organizational Requirements for Information Sharing, *Journal of Management Information Systems*, Armonk, 8(4), 27-42.
- Leedy, P.D. & Ormrod, J. E. (2010) *Practical Research: Planning and Design*,

- Leenders, M. R. & Fearon, H. E. (1997). *Purchasing and Supply Chain Management*, Boston (MA): McGraw-Hill.
- Leenders, M. R., & Fearson, H. E., (1997). *Purchasing and Supply Management*, (11th edition), Boston: McGraw-Hill.
- Lewis, J.L. & Sheppard, S.R.J (2006). Culture and communication: can landscape visualization improve forest management consultation with indigenous communities?. *Landscape and Urban Planning*, 77, 291–313.
- Li, S. (2002). *An Integrated Model for Supply Chain Management Practice, Performance and Competitive Advantage*. In: *Manufacturing Management*, Ohio: The University of Toledo.
- Love, PED., Irani, Z, & Edwards, DJ. (2004). A seamless supply chain management model for construction. *Suppl. Chain Manage. An Int. J.*, 9(1), 43-56.
- Lucas, S.R. (2014a). Beyond the Existence Proof: Ontological Conditions, Epistemological Implications, and In-Depth Interview Research. *Quality & Quantity*, 48, 387-408. doi:10.1007/s11135-012-9775-3.
- Lwiki, T., Ojera, P. B., Mugenda, N. G., & Wachira, V. K. (2013). The Impact of Inventory Management Practices on Financial Performance of Sugar Manufacturing Firms in Kenya. *International Journal of Business, Humanities and Technology*, 3(5).
- Mahinda, S. W. (2015). Challenges of Implementing E-Procurement in State Corporation-A Case Study of Kenya Ports Authority. *The International Journal of Business & Management*, 3(10), 371.
- Makau, J. K. (2014). Challenges facing adoption of electronic procurement in public sector in Kenya: A case of Nairobi Water and Sewerage Company.

International Journal of Social Sciences and Entrepreneurship, 1(11), 267-286.

Malone, T., Yates, J. & Benjamin, R. (1987). Electronic markets and electronic hierarchies: effects of information technology on market structure and corporate strategies, *Communications of the ACM*, 40(6).

Mambo, P. N. (2015). Factors influencing implementation of e-procurement in the national government: a case of the ministry of interior and co-ordination of national government. *Strategic Journal of Business and Change Management*, 2(1).

Massauer, V. T. (2011). Best business practices in operative Einkauf. *Wirtschaftsinformatik & Management*, 3, 20-23.

Mathieson, K. (2001). Predicting User Intentions: Comparing the Technology Acceptance Model with the Theory of Planned Behavior, *Information Systems Research*, 2(3), 173-91.

McCue, C. & Roman, A. (2012). E-Procurement: myth or reality?, *Journal of Public Procurement*, 5(1), 54–72. McGraw Hill.

McIntosh, G. & Sloan, B. (2001). The potential impact of electronic procurement and global sourcing within the UK construction industry, Proceedings of Arcom 17th Annual Conference 2001, (Akintoye A. Editor), University of Salford, September 2001, 231-239

McKone-Sweet, K. & Lee, Y-T. (2009). Development and Analysis of a Supply Chain Strategy Taxonomy. *Journal of Supply Chain Management*. 45(3), 3-24.

Migai, J. (2010). *Development Partners and Governing Non Governmental Organizations Procurement in Kenya*. Kenya: Macmillan Publishers.

- Miguel, P. L. S. & Brito, L. A. L. (2011). Supply Chain Management Measurement and its Influence on Operational Performance. *Journal of Operations and Supply Chain Management*, 4(2), 56-70.
- Mogere, K. M., Oloko, M., & Okibo, W. (2013). Effect of Inventory Control Systems on Operational Performance of Tea Processing Firms: A Case Study of Gianchore Tea Factory, Nyamira County, Kenya. *The International Journal Of Business & Management*, 1(5)
- Mohd, H., Robie, M., Afdhal, M., Baharom, F., Nordin, N., Muhd Darus, N., ... & Hashim, N. L. (2012). Misuse case modeling for secure e-tendering system. In: *Knowledge Management International Conference (KMICe) 2012*, 4 – 6 July 2012, Johor Bahru, Malaysia.
- Morris, S. S., Snell, S. A. and Wright, P. M. (2005). A Resource-based View of International Human Resources: Toward a Framework of Integrative and Creative Capabilities. Working paper,. Ithaca, NY: Cornell University, School of Industrial and Labor Relations, Center for Advanced Human Resource Studies.
- Mose, J. M., Njihia, J. M., & Magutu, P. O. (2013). The Critical Success Factors and Challenges in E-procurement Adoption among Large Scale Manufacturers in Nairobi Kenya. *European Scientific Journal May 2013 edition*, 9, 13
- Mota, F. P.B., & Filho, J.R. (2011). Public E-procurement and the Duality of Technology. *Journal of Information Systems and Technology Management*, 8(2), 315-330.
- Mubina, S. M., (2013). *International Journal of Emerging Technology and Advanced Engineering* Retrieved from: www.ijetae.com

- Muhia, D. W. & Afande, F. O. (2015). Adoption of e-procurement strategy and procurement performance in State Corporations in Kenya: A Case of Kenya Revenue Authority. *Industrial Engineering Letters*, 5(6), 1-24.
- Muinde, C. & Shale, J. (2014). Role of e-procurement strategy in enhancing procurement performance of saving and credit cooperatives in Kenya: Case of Kitui Teachers SACCO Limited. *International Journal of Social Sciences and Entrepreneurship*, 1(12), 848-862.
- Muindi, A. (2014). Factors influencing efficient public procurement in the free primary education. *Journal of supply chain Management*, 33(11), 131-134.
- Musuga, B. & Namusonge, G. (2013). Medical products demand and supply stability as a factor influencing implementation of JIT supply chain management policies. A case study of the Ministry of Public Health and Sanitation in Kenya: Proceedings of 1st JKUAT Research Conference, 12th and 13th September
- Mutangili, S. K. (2014). An assessment of the adoption of e-procurement application systems on supply chain management environment in Kenya: A case of Zain Kenya Limited. *International Academic Journals*, 1(1), 38-61.
- Mwangi, W.N. (2013). Factors hindering adoption of e-procurement in telecommunication industry in Kenya: case of Safaricom limited. *International Journal of Social Sciences and Entrepreneurship*, 1(3), 138-148.
- Nafula, B.J. & Namusonge, G. (2017). Effect of e-procurement practices on efficiency frontier of Kakamega county government, *International journal of social sciences and technology*, 2147- 2157.

- Namusonge, G. S. (2010). *Business Statistics: Concepts and Applications*. Beau Bassin, Mauritius: VDM Publishing House Ltd.
- Neef, D., (2001). *E-Procurement: From Strategy to Implementation*, London: Financial Times Prentice Hall.
- Ngeno, K., & Kinoti, J. (2017). Effect of e-procurement on effective supply chain management process in energy sector in kenya. *International Journal of Supply Chain Management*, 2(3), 18-37.
- Northouse, P. G. (2007). *Leadership: theory and practice*. (4th ed.) Thousand Oaks, CA: Sage Publications.
- Nyagah, K. & Patrick, M. (2015). Influence of e-procurement implementation on supply chain performance in dairy industry in Kenya: a case of new KCC limited. *International Journal of Innovative Social Sciences & Humanities Research*, 3(2), 31-4.
- Nyile, E.K. & Shale, N.I. (2016), role of sustainable procurement practices on supply chain performance of manufacturing sector in Kenya: a case study of East African Portland cement company. *European Journal of Logistics, Purchasing and Supply Chain Management*, 4(3), .1-31.
- Oliveira, L. & Amorim, P, (2001). Public E-Procurement, *International Financial Law Review*, 43-47.
- Oliver, V., (2010). *301 Smart Answers to Tough Business Etiquette Questions*, New York USA: Sky horse Publishing.
- Patrick Connaughton, Robert Derocher and Amy Fong, (2014). Understanding E-procurement, Quantifying the Benefits

- Paul, T., (2000). *Electronic Commerce - strategies and models for business-to-business trading*, pp.31, New York: John Wiley & Sons Ltd,
- Pearcy, D., Giunipero, L., & Wilson, A. (2007). A model of relational governance in reverse auctions. *Journal of Supply Chain Management*, 43(1), 4-15.
- Poirier, C, (1999). *Advanced Supply Chain Management: How to Build a Sustained Competitive Advantage*, San Francisco, CA Berrett-Koehler Publishers.
- Poirier, C.C. & Bauer, M.J. (2000). *E-Supply Chain - Using the Internet to Revolutionize your Business*, San Francisco (CA): Berrett-Koehler Publishers.
- Porter, M., (1993). Differential Strategy, *Harvard Business Review*, 74(6), 61
- Porter, M.E. (1985). *Competitive Advantage. Creating and Sustaining Superior Performance*. New York: The Free Press
- Porter, M.E., (1999). *Microeconomic competitiveness: Findings from the 1999 Executive Survey.*, Geneva: World Economic Forum, Global Competitiveness Report.
- Presutti, W. D. (2003). Supply Management and e-procurement: Creating Value Added in the Supply Chain. *Industrial Marketing Management*, 32(3), 219-226.
- Public Procurement Oversight Authority (PPOA) (2011). Final report Procurement review of National Social Security Fund (NSSF). *PPOA/NSSF: PPOA*.
- Public Procurement Oversight Authority, (2014). Quarterly Bulletin. Issue No. 04, December 2014, Trends in Electronic Procurement in Kenya, Retrieved from: ppoa.go.ke.
- Public Procurement Oversight Authority, (PPOA), (2009).The long term policy framework for public procurement in Kenya, Draft zero. Nairobi: PPOA.

- Puschmann, T. & Alt, R. (2005). Successful use of e-procurement in supply chains, *International Journal of Supply Chain Management*, 10(2), 122–133.
- Quinnox, (2012). E - Procurement the Future of Supply Chain. Retrieved on April 2, 2012 from TechRepublic.
- Rai, A., Brown, P., & Tang, X. (2009). Organizational assimilation of electronic procurement innovations. *Journal of Management Information Systems*, 26(1), 257-296.
- Rajab, N. F., Namusonge, G., & Shaelle, N. (2016). Effect of Electronic Supplier Management Practices on the Implementation of Preference Regulations on State Corporations in Kenya. *International Journal of Innovative Research and Development*, 5(13).
- Ratanya, E. (2013). *E-procurement implementation and supply chain integration among large scale manufacturing firms in Nairobi, Kenya*. Unpublished MBA project Nairobi: University of Nairobi.
- Renko, S., & Druzijanic, M. (2014). Perceived usefulness of innovative technology in retailing: Consumers' and retailers' point of view. *Journal of retailing and consumer services*, 21(5), 836-843.
- Ritter, N. (2010). Understanding a widely misunderstood statistic: Cronbach's alpha. Paper presented at Southwestern Educational Research Association (SERA) Conference 2010: New Orleans, LA (ED526237).
- Robinson Jr, E.P., Sahin, F., & Gao, L.L. (2005). The impact of e-replenishment strategy on make-to-order supply chain performance. *Decision Sciences*, 36(1), 33-64.

- Rotich, G. K., & Okello, B. (2015). Analysis of use of e-procurement on performance of the procurement functions of County Governments in Kenya. *International Journal of Economics, Commerce and Management*, 3(6), 1381-1398.
- Rotich, G., Muma, B. & Waruguru, E. (2015). Relationship between E-Tendering and Procurement Performance among County Governments in Kenya. *Science Innovation*. 3(5), 46-51. doi: 10.11648/j.si.20150305.11
- Samuelson, P. (1965). Proof That Properly Anticipated Prices Fluctuate Randomly. *Industrial Management Review*, 6, 41–49.
- Saunders, M., Lewis, P., & Thornhill, A. (2012). *Research Methods for Business Students* (6th ed.). Edinburgh: Pearson Education.
- Shalle, N. I., Guyo, W., & Amuhaya, I. M. (2013). Role of E-Procurement Strategy in Enhancing Procurement Performance in State Corporations in Kenya. *International Journal of Science and Research*, 2(11), 421-426.
- Shalle, N. I., Guyo, W., & Amuhaya, I. M. (2014). Effects of Buyer/Supplier Collaboration on E-Procurement Performance in State Corporations in Kenya, *European Journal of Management Sciences and Economics*, 1(4), 170- 185
- Shields, P. M., & Rangarajan, N. (2013). *A playbook for research methods: Integrating conceptual frameworks and project management*. Stillwater, OK: New Forums Press.
- Simchi-Levi, D., Kaminsky, P. & Simchi-Levi, E. (2010). *Designing and Managing the Supply Chain: Concepts, Strategies, and Case Studies*. Boston, MA: McGraw-Hill.

- Simchi-Levi, D., Kaminsky, P., & Simchi-Levi, E. (2003). *Managing the Supply Chain*, Boston, MA: McGraw-Hill.
- Simichi-Levi, D., Kaminsky, P., & Simchi-Levi, E., (2000). *Designing and Managing the Supply Chain*, Boston: McGraw-Hill.
- Stratman, J.K. & Roth, A.V. (2004). *Enterprise Resource Planning Competence: A Model, Propositions and Pre-Test, Design-Stage Scale Development*, Proceedings of the 30th Annual Meeting of the Decision Sciences Institute, New Orleans, pp. 199-201.
- Tai, Y.M., Ho, C.F., & Wu, W.H. (2010). The performance impact of implementing web-based e-procurement systems. *International Journal of Production Research*, 48(18), 5397-5414.
- Talluri, S., Narasimhan, R., & Viswanathan, S. (2007). Information technologies for procurement decisions: a decision support system for multi-attribute e-reverse auctions. *International Journal of Production Research*, 45(11), 2615-2628.
- Teo, T. S., & Lai, K. H. (2009). Usage and performance impact of electronic procurement. *Journal of Business Logistics*, 30(2), 125-139.
- Toktaş-Palut, P., Baylav, E., Teoman, S., & Altunbey, M. (2014). The impact of barriers and benefits of e-procurement on its adoption decision: An empirical analysis. *International Journal of Production Economics*, 158, 77-90.
- United Nations (2011). E-Procurement: Towards Transparency and Efficiency in Public Service Delivery. Report of the Expert Group Meeting 4-5 October, United Nations Headquarters, New York

- United States Agency International Development, (2008). Integrated Financial Management Information System. Retrieved from www.usaid.gov on 20th February, 2015
- USAID. (2013). *Addressing Procurement Bottlenecks. A Review of Procurement Bottlenecks in Public Sector Medicine Supply Chains and Practical Approaches*. Arlington: USAID.
- Van Weele, A. (2002). *Purchasing and Supply Chain Management, Analysis, Planning and Practice*, London: Thomson Learning.
- Van Weele, A.J. (2010). *Purchasing and Supply Chain Management: Analysis, Strategy, Planning and Practice*, (5th ed). London: Thomson Learning.
- Varney, M. (2011). *E-Procurement—current law and future challenges*. In *ERA Forum* (Vol. 12, No. 2, pp. 185-204). New York: Springer-Verlag.
- Varney, M. (2011). E-Procurement—Current Law and Future Challenges. *ERA-Forum*, 12(2), 185-204.
- Venkatesh, V. (2010). Determinants of perceived ease of use: integrating control, intrinsic motivation, and emotion into the technology acceptance model, *Information Systems Research*, 11(4), 342-65.
- Ventura, J., Reise, S. P., Keefe, R. S., Hurford, I. M., Wood, R. C., & Bilder, R. M. (2013). The Cognitive Assessment Interview (CAI): reliability and validity of a brief interview-based measure of cognition. *Schizophrenia bulletin*, 39(3), 583-591.
- Wachiuri, E. W., Waiganjo, E., & Oballah, D. (2015). Role of supplier development on organizational performance of manufacturing industry in Kenya; a case of EastAfrica Breweries Limited. *Int. J. Educ. Res*, 3(3), 683-694.

- Wagner, C. M. and Sweeney, E. (2010). E-Business in Supply Chain: National Institute for Transport and Logistics Management. *Modeling and implementation* (pp. 24-42). IGI Global.
- Waithaka, H. K., & Ngugi, K. (2014). Factors influencing Acquisition of Stressed Assets and Asset Securitization into the Financial Market in Kenya. *International Journal of Social Sciences and Entrepreneurship*, 1(2), 529-539.
- Waniani, N., Namusonge, G. & Lagat, M. (2016). Factors Affecting Implementation of E-Procurement in Nzoia Sugar Company Limited in Bungoma County, Kenya. *International Journal of Recent Research in Social Sciences and Humanities (IJRRSSH)* 3(2), 134-150. Retrieved from: www.paperpublications.org
- Wanjiru, D. K. (2014). Effects of records management on the efficiency of the Procurement. *Supply chain Management*. 20(11), 132-139.
- Wanyonyi, S. & Moturi, W. (2015). Factors affecting performance of procurement function among public technical training institutions in Kisumu County, Kenya, *International Journal of Economics, Commerce and Management, United Kingdom*, III(5).
- Weele, A.J., (2001). *Purchasing and supply Chain Management: Analysis, Planning and Practice*, (3rd revised ed.), London, England: Thomson International
- Williamson, O.E. (1985). *The Economic Institutions of Capitalism*. Free Press: New York, NY
- Wilson, J. (2010). *Essentials of Business Research: A Guide to Doing Your Research Project*, London: SAGE Publications

- Wuyts, S. H., Dekimpe, M. G., Gijbrecchts, E., & Pieters, F. R. (Eds.). (2011). *The connected customer: The changing nature of consumer and business markets*. New York: Routledge.
- Xianfeng, Q, Boxiong, L, & Zhenwei, G. (2008). Conceptual model of IT infrastructure capability and its empirical justification. *Tsinghua Sci. Tech.*, 13(3), 390-394.
- Xu, Z., Frankwick, G. L., & Ramirez, E. (2016). Effects of big data analytics and traditional marketing analytics on new product success: A knowledge fusion perspective. *Journal of Business Research*, 69(5), 1562-1566.
- Yamane, T. (1967). *Statistics: An Introductory Analysis*, (2nd ed.), New York: Harper and Row.
- Yen, B.P.C. & Ng, E.O.S. (2003). The impact of electronic commerce on procurement'. *Journal of Organizational Computing and Electronic Commerce*, 13(3-4), 167-189.
- Yin, R.K. (2014). *Case study research: Design and methods*. Thousand Oaks: Sage publications.
- Zenz, G. (1994). *Purchasing and the Management of Materials*, New York: John Wiley and Sons.

APPENDICES

Appendix I: Questionnaire

Introduction

My name is Evans Biraori Oteki, a student at Jomo Kenyatta University of Agriculture and Technology conducting a research on a topic entitled ‘**Influence of E-procurement on Supply Chain performance of sugar processing firms in Kenya**’ This is in partial fulfillment of the requirements for the Award of a post graduate degree in Supply Chain Management. All information you provide will be treated with utmost confidentiality, not identifiable to you and only used for academic purposes. Thank you in advance.

PART A: SUPPLY CHAIN PERFORMANCE

1. Does electronic procurement enhance supply chain performance in your organization?

Yes [] No []

2. In your opinion, to what extent do you agree with the statements relating to electronic procurement application on supply chain performance?

E- procurement practices	Very large extent	Large extent	Moderate extent	Small extent	Not at all
Reduces purchasing cost					
Improves efficiency and time taken to complete procurement process					
Standardizes purchasing process across the organization					
Reduces administrative cost with better effectiveness					
Improves effectiveness of supply chain processes(standard process)					
Reduces discretion & increases transparency					
Improves supply chain managers decision making					
Reduction in errors of order transmission					
Reduces procurement corruption					
Reduction in inventory					
Stronger buyer-vendor relationship					

PART B: ELECTRONIC TENDERING

3. Does electronic tender processing enhance supply chain performance in your organization?

Yes [] No []

4. Indicate the extent to which the following statements on Electronic Tendering on supply chain performance are true.

E-Tender processing practice	Very large extent	Large extent	Moderate extent	Small extent	Not at all
Reduces tender processing time.					
Eliminates postal, printing & storage costs.					
Suppliers are able to access tenders/quotation/requests any time anywhere in the world					
Tender documents cannot be accessed by unauthorized person					
Alteration of tender documents is impossible or easy to detect.					
Neither party can deny sending or receiving documents					
Ability to eliminate non-compliant bids automatically					
Provides fairness to all regardless of geographic location of a supplier					
Improves audit trails					
Reduces corruption					
Computer/network malfunctions can affect bid submission					

PART C: ELECTRONIC ORDER PROCESSING

5. Does electronic order processing enhance supply chain performance in your organization?

Yes [] No []

6. Indicate the extent to which you agree to the statements of electronic order processing on supply chain performance.

E-order processing practice	Very large extent	Large extent	Moderate extent	Small extent	Not at all
Reduces order processing time.					
Reduces paperwork thus reduced costs.					
Reduces human errors.					
Assists to monitor order due dates					
Electronic invoice payment improves supplier relationship.					

7. If any, indicate other advantages of electronic order processing.

.....

PART D: ELECTRONIC MATERIAL MANAGEMENT.

8. Does electronic material management enhance supply chain performance in your organization?

Yes [] No []

9. To what extent you agree to the following statements on electronic material management on supply chain performance.

	Very large extent	Large extent	Moderate extent	Small extent	Not at all
E-material management practice					
Real-time stock levels enable inventory manager to quickly see which products have reached this re-order level.					
Inventory in each warehouse is accessible to management					
Enables count of inventory throughout the supply chain					
By use of Bar codes store's inventory can be automatically adjusted to account for items leaving the store.					
Minimizes inventory carrying costs as electronic information enables better decisions on reorder quantities.					
Visibility of product availability is critical to efficient operations.					

10. If any, indicate other advantages of electronic material management on supply chain performance.....

.....

PART E: ELECTRONIC SUPPLIER MANAGEMENT

11. Does electronic supplier management enhance supply chain performance in your organization?

Yes [] No []

12. Indicate to what extent you agree to the following statement on E- supplier management on supply chain performance

E-supplier management practice	Very large extent	Large extent	Moderate extent	Small extent	Not at all
Buyers and suppliers develop a single shared forecast of demand and a plan of supply					
Buyers issue order of materials from the suppliers is streamlined.					
Quick information sharing with suppliers					
Predictability of flow of goods					
Electronic payment to suppliers improve delivery					
Improved relations with channel partners					

13. If any, indicate other advantages of Electronic supplier management.

.....

Thank you

Appendix II: Interview Guide

The following items relate to topical areas related to E-procurement and supply chain performance in your organization. Please provide your candid views with respect to each of the items.

1. Supply chain performance

Does E-procurement enhance supply chain performance?

What are some of the benefits of E-procurement?

2. E-tendering

Does application of E- tendering in your organization enhance supply chain performance?

What are some of the benefits E-tendering?

3. Electronic order processing

Does E-order processing enhance supply chain performance?

What are some of the benefits of Electronic order processing?

4. Electronic material management

Does E-material management enhance supply chain performance?

What are some of the benefits of Electronic material management?

5. Electronic supplier management

Does E-Supplier management enhance supply chain performance?

What are some of the benefits of Electronic supplier management?

6. Any other relevant E-procurement practices in your organisation?

Appendix III: Observation Guide

The following items relate to topical areas related to E-procurement and supply chain performance in the organization. Observations to be done on the following items to prove application of e-procurement and how it is enhancing supply chain performance.

1. Request to look at the file for goods Received note and goods issue note.

Are they manual or electronically system generated?

2. Request to look at the reports file

Are they manual or electronically system generated?

3. Request for a certain report

Is the respondent referring to the system real time to show you the report of your request?

4. Observe receipt of goods and issue if it is being done while present.

5. Request a respondent to explain a certain procedure to note any reference to the electronic system.