INFLUENCE OF ELECTRONIC PROCUREMENT ON SUPPLY CHAIN PERFORMANCE OF FIRMS IN THE ENERGY SECTOR IN KENYA

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DECLARATION

I declare that this dissertation is my original work and has not beenpreviously published or submitted elsewhere for award of a degree. Ialso declare that this contains no material written or published byother people except where due reference is made and author dulyacknowledged.

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ABSTRACT

Digital procurement is the most prominent area where internet was used to curb the challenges which were being faced before ICT was implemented. However, despite the organizational benefits obtainable by the adoption of the electronic procurement,1the challenges and associated risks are widespread. The purpose of the study was to assess influence of electronic procurement on supply chain performance in energy firms in Kenya with an aim of making recommendations on proper use of electronic procurement on supply chain performance. The study was guided by the following objectives electronic data interchange, electronic material management, electronic tendering and Supply chain integration influence of electronic procurement on supply chain performance at kenya power company. The study was guided by the following theories value chain theory, capability dynamic theory, innovation diffusion theory and resource based view theory. To achieve this, the study reviewed both theoretical and empirical literature and propose the research methodology that addressed the gaps identified in literature as well as answer the stipulated research questions. This research study adopted descriptive research design approach. The targeted firms in the energy sector that were listed at Nairobi Securities Exchange, that is Kenya Power Ltd, Kengen Ltd, KenolKobil Ltd and Total Kenya Ltd where a total of 256 respondents from the procurement, finance, administration, Information technology, Human resource and Marketing departments were targeted. A sample size of 30% was adopted and hence 77 respondnets were targeted. Data was gathered using structured questionnaire, then analyzed using inferential and descriptive statistics where it was analyzed by use of descriptive and inferential statistics through SPSS 24. The study findings indicated an increase in Electronic Data Interchange leads to a significant improvement in supply chain performance of the firms in the enegy sector in Kenya. It was also established that an increase in Electronic Material Management leads to a significant improvement in supply chain performance of the firms in the enegy sector in Kenya. The study findings also showed that an increase in Supply Chain Integration leads to a significant improvement in supply chain performance of the firms in the enegy sector in Kenya. However, Electronic Tendering has no significant association with supply chain performance of firms in the energy sector in Kenya. It can therefore be recommended that the firms in the energy sector to continuously invest in enhancing Electronic Data Interchange, supply chain integration and Electronic Material Management so as to realize significan supply chain performance in the long run.

Key Words: Electronic Data Interchange, Electronic Material Management, Electronic Tendering, Supply Chain Integration, Supply Chain Performance, Energy Sector

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DEDICATION

This project is dedicated to my family they have supported,encouraged and walked with me fully. I also dedicated it to my lovely daughter Joyce Wanjiru who has given me ample time to carry out my studies prayed God for her mum day and night know you have a place in my heart dear. My sisters and Brothers Bilha Ng'ang'a, Joseph, GG you have really supported me financially and emotionally I am indebted of word to thank you, John, Kim, Mercy, Julie, Shiro, Kimani Mugo and Bilha junior thank for your support throughout my studies. Lastly to my parents Mr. and Mrs. Gitau, you have worked with me from day one, you supported me wholeheartedly without getting weary and with prayers may God reward you, It not in vain. To anyone who it may be useful to either directly or indirectly.

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ACRONYMS AND ABBREVIATIONS

E- TENDERING:	Electronic Tendering
E- PROCUREMENT:	Electronic Procurement
EDI:	Electronic Data Interchange
ERP:	Enterprise Resources Planning
IT:	Information Technology
KENGEN:	Kenya Electricity Generation Company
KPC:	Kenya Power Company
KPLC:	Kenya Power and Lighting Company
PPDA:	Public Procurement and Assets Disposal Act
SCM:	Supply Chain Management
SCP:	Supply Chain Performance

TERMS AND DEFINITION

Electronic Data Interchange: Its web-based system which enables electronic organisation to transfer information and automate the order processing Timely (Huemer and Zap et, al 2020).

Electronic Procurement: It's also known as electronic procurement, it involves purchases and sales of supplies, equipment, work and services through Internet or networked systems (Chen, et al 2021).

Electronic Tendering: This is an online process where all activities of tendering are been Conducted (Nani &Ali, 2020).

Material Management: It involves planning, storing and logistics of material, assist to ensure the organisation get the required materials in the right Time, place and quantity to ensure continuous flow of work (Ancheta, 2017).

Supply Chain Integration: Its collaboration of organisations internally or externally on managing while coordinating flow of materials and Resources of the customers upstream and downstream (Chen et al….2017).

Supply Chain Management: Refers overall goal achieved by an organisation while using E Procurement to carry out their activities (Sanil 2016).

Supply Chain performance: Its very vital strategy which is used to enhance organisation and its lead-time (Muhoho &makali 2020).

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Organisations are forced towards adopt electronic procurement due to stiff competition arising from advanced technology, when a company fail to adopt electronic processes, it will not achieve competitive advantage in the market (Masudin, et al. 2021). E-procurement refers to electronic procurement where two parties must be involved in making sales and purchases of goods, services and consultancy by use of internet, the parties involved includes business, consumers and Government (Chen,et al….2021). Electronic procurement refers to integrated web based database systems used to carry out these activities negotiation, Ordering, receipt and payment. It also involves purchasing of goods and services through use of electronic process with the aim of saving cost, resources and time. Application of e- procurement in public organisation is yet to be adopted fully since it's still in early stage (Iles, 2017). According to Sánchez-Rodriguez, Martinez-Lorente and Hemsworth, (2019) there is little history on public sectors embracing Electronic procurement.

Online procurement is key drive of transformation towards Economic and social aspects worldwide. "Technology information and communication are backbones of industrial and commercial activities of human survival in this era, where its adoption has improved public organisation activities towards their customers" (Saleh, 2018). Benefit which accrues are cost-effective total solution, better customer satisfaction, quality products, shorter lead time and innovative idea and methods. Other advantages of using E-procurement includes integration and collaboration of data through internet from the buyer to a seller or supplier. In 1970s Organisations were using Enterprise Resource Planning (ERP), which later advanced

to commercial internet. In 1990s world web multimedia emerged which provided the essential resources and assisted on computerization of procurement. (Iles, 2017).

Practices of E-procurement tools helps on centralising the work and automate interactions between two or more parties, it also improves on speed and ensure efficiency on supply chain practises hence enhancing relationship which exist between end customer, supplier and organisation through providing quality product, reduced costs, increased speed and facilitate effective means of communication through internet, email, telephone, conference calls and videos.

Supply chain practices alone cannot be fully effective on goal achievements (Choi, et al. 2016). A complete E-procurement system should contain all the elements required the of supply chain are procurement planning, supplies evaluation and information integration which enables smooth flow of information when interacting with E-procurement functioning. The most adopted procurement practices are E-payment, E-tendering, electronic requisition, quotations and E-invoicing. Use of inappropriate software and hardware system will lead to collapse of the whole process of E-procurement. According to Tran, Steve and Stewart, (2021) E- procurement on itself doesn't accrue any benefit in an Organisation but influences purchasing process, Procedure, purchasing philosophies, and trade affairs.

Procurement process refers to purchasing of services, goods and works of right quality and quantity at required, then delivered in the required location to meet the purchaser needs. Procurement was developed purely as administrative function, on terms of supply chain function, it can also be a strategic function rather than administrative one. Choi, et al. (2016) in their five porter model, they emphasize mostly on supplier-buyer power as a critical force influencing achievement of competitive advantage

Traditional procurement process had many inefficiencies which resulted from long lead time period, complicated techniques processes which were unnecessary in procurement like record documentation and transactional activities. Implementation of advanced digital procurement in an organisation improves the supply chain management positively because it make changes in development of businesses in the whole world (Saleh, 2018). Due to those inefficiencies which were occurring in organisations, they acknowledged that administrative paperwork served each document at a time, resulting to time wastage in prominent period of purchasing (Aduwo, et al. 2016).

Organisations transformed clerical works by abolishing, decreasing and merging unnecessary steps involved in procurement so that it can result to value addition. When E-procurement system is installed inappropriately without analysing organisation problem, the intended benefit will not be achieved hence leading to wastage of time and money (Iles, 2017). E-procurement should increase productivity, shorten lead time, improve inventory management and eliminate errors and mistakes. Procurement is vital in any Organisation and plays a big role in influencing company's performance.

Globally E- Procurement has gained popularity due technology revolution and advancement. In developed country like United states of America procurement development started in early 2000s.Where all state functions were participating in online bidding (Iles, 2017). In Malaysia, they emphasized all suppliers to use E- procurement system due to its efficiency. According to Choi, et al. (2016) Indonesians were experiencing rapid changes in technology which forced embracing of electronic procurement in their procedures.

E procurement execution also influenced government to start electronic programmes which assisted the government on achievement of procurement principles i.e. transparency, competitiveness, honesty, integrity and accountability. This benefits the government,

company and purchaser. Review conducted in 2005 by Common wealth indicated that Government some countries like Scotland, Australia and Italy were practising electronic procurement while conducting procurement activities (Iles, 2017).

E-procurement refers to exchange of information electronically, while conducting purchasing and supply chain process whether internally or externally (Gasco, et al. 2018). Developed countries like US, UK, Malaysia and Australia have employed information technology in their procurement operations. In USA, information technology on procurement have played greater role in organisations.

Conducting purchasing through e- procurement enables organisation to work effectively and efficiently with suppliers who are willing to emphasize on its success (Saleh, 2018). This can lead to high productivity and improved performance hence being competitive in the market. Through the help of information technology in procurement processes, many countries like USA and Malaysia, have estimates of financial activities of Government ranging between 10%-30% of GNP.

In USA they procure between $1.4 and $1.6 trillion annually due to technology evolution, supply chain is used in different processes like when making orders, planning on delivery of goods and coordinating between the source and user (Truong, 2019). In India Lewis Faupel et al.(2016) argues the quality delivery of information on making decision at right time and in automation of data collection process, checking and enhancement, organisation has to make information technology its friend and make its use in best way possible.

In Ghana, Tutu, et al. (2019) stated that top managements and employee's in general, supports E- procurement. E-procurement skills, enhances ERP success, which influences supply chain management process. Further they states that information technology effects on

procurement process are due to sharing out information that are influenced by strategies, suppliers, partnership collaboration and users because procurement is a continuous process of supplying raw materials.

Companies succeeding in stiff competition, are those adopting supplier relationship management in business. Through engaging in strategic partnership, quality products and cost effectiveness is achieved. In Nigeria it was noted that information technology played a great role in manufacturing companies through supplier relationship and in products design process where their prices are effective hence assist in design assessments (Ibem et al. 2016). In Nigeria Aduwo, 2016 stated that ICT assisted to advance technology processes and enhanced improvement in the textile business, which helped to increase competition in cloth manufacturing companies and improve in Supply chain factors.

In Africa, E-procurement process has gained popularity, due to its principles which deals with some problems experienced, in public sectors like lack of accountability, lack of transparency, corruption and bribery in procurement activities, due to these factors, They have shifted their systems to legal reforms and embraced electronic procurement systems which performs procurement activities effectively. The systems includes e- evaluation, e-invoicing- advertising, e- submission, e- contracting, e-payment, e- monitoring which allows all procurement activities to be conducted online (Mafini, Dhurup & Madzimure, 2020).

Procurement requisitions assist the employees while making purchases, where described item must match with work intended, quality, cost, its efficiency and budget. It helps procurement department to track the requisition while in process until the delivery of good has been made. This technology automates and streamlines procurement process making it more efficient, less costly, faster, and eliminates low value tasks, hence facilitating

negotiation contracts. The leaders are able to eliminate procurement experiences through application of E-procurement.

The use of e-procurement in the energy sector can have a major impact on supply chain performance. E-procurement helps to reduce costs and lead times associated with procurement activities, enabling energy companies to obtain materials and services faster and more efficiently (Kannan & Kannan, 2013). This can lead to improved delivery times and reduced inventory costs, resulting in better overall supply chain performance (Sousa & Fleming, 2018). Additionally, the automation of procurement activities can reduce errors, resulting in more efficient and streamlined processes (Al-Nabhani, 2017). As a result, energy companies can be more agile and responsive to changing market conditions, leading to improved performance.

E-procurement can also help energy companies to better manage their supplier relationships through the use of collaborative tools and data analytics (Lee & Billington, 2014). This can enable them to better understand supplier performance and identify areas for improvement. Furthermore, e-procurement can help energy companies to manage risk and ensure compliance with regulations and safety standards (Kumar, 2016).

This can result in improved supply chain performance, as companies are better able to manage risk and ensure the quality of their products and services. Overall, the use of e-procurement in the energy sector has the potential to greatly enhance supply chain performance. By reducing costs and lead times, improving supplier relationships, and managing risk, energy companies can benefit from improved operational efficiency and performance.

In Kenya most Organisation have adopted electronic procurement to help them improve their supply chain processes. According to Mutangili, (2019) PPAD2015 Public

Procurement and Assets Disposal regulates public procurement. It defines procurement as acquisition through lease, rental, license, hire purchase, purchase or contract. Government used PPAD 2015 act to achieve sustainability on public procurement, with major benefits like cost savings, reduction in management expenditures, improve supply chain processes ,create good link in collaboration among the party involved in supply chain.

According toMwangi and Kagiri, (2016) study conducted in British American Tobacco Kenya Ltd E-procurement has increased information processing capacity, Improving of productivity and improving relationship where promises are maintained. Evolution of technology has led to developing ERP Systems, Electronic payment, E wallet, bar coding and Tracking of supply chain process. Much has not been done to influence the perfection on supply chain management process system (Matano, Musau & Nyaboga, 2020).

1.1.1 Firms in the Energy Sector in Kenya

The energy sector in Kenya contributes largely to the economy of the country. Kenya generates about 1.762MW of electricity that is distributed throughout the country. Kenya Power is a limited liability company responsible for the transmission, distribution, and retailing of electricity throughout Kenya. Kenya Power owns and operates the national transmission and distribution grid, and retails to more than 850,000 customers throughout Kenya (Kenya Power; Project Mwangaza Bulletin).

Kenya power is listed in Nairibi Securities Exchange(NSE) as a public company, located at Parklands in Nairobi. Its head office is located at Stima plaza, Kolobot road. Its mission focuses on powering people by innovatively securing business sustainability for better lives. Its mandates is to distribute, transmit and marketing power to consumers throughout the country (Kalogeria, Bett & Wanjala, 2019).

The core values of Kenya power are “consider customers first, work as a team to enable them achieve their goals, provide services of powering the nation, Integrity and delivering on their promises to their customers and ensure their satisfaction, they strive to excel in all the activities they are carrying out, accountability in their work toward their customers and stakeholders.” Kenya Power was incorporated in 1922, then named East Africa Power and Lighting Company limited because it operated in the three countries which are Kenya, Uganda and Tanzania. On 1st February, 1954 it was appointed to construct transmission line between Nairobi and Tororo in Uganda. At the end of June 2020 it had supplied electricity to over 8.0 million customers. (Yala, 2018).

Kenya Power and Lighting Company was reformed on 1983 from East Africa Power and Lighting Company (EAPC&L). Their responsibility was to generate, transmit and distribute electricity, until 1997 when it was relieved the task of generating power and retained the task of transmitting and distributing power only. In June, 2011, the company was rebranded Kenya Power (Njeru, Gathiaka & Kimuyu, 2021). The company’s gets its main source from other sub sectors of power like (IPP) independent power producer and KENGEN.

1.2 Statement of the Problem

The energy sector is highly dependent on the efficient procurement and delivery of products and services. E-procurement solutions can provide a number of benefits to the energy sector, including improved supply chain performance. E-procurement can streamline the procurement process, leading to cost savings, improved supplier relationships, and improved data visibility and management. These benefits can lead to improved supply chain performance, including improved inventory management, better forecasting, and reduced lead times (Mesquita & Frazão, 2019). Additionally, e-procurement can reduce paperwork and

other administrative costs, enabling energy sector businesses to focus their resources on more productive activities (Das et al., 2018).

Furthermore, e-procurement can improve risk management by providing greater transparency and traceability in the supply chain (Biswal et al., 2017). By providing visibility into the entire procurement process, e-procurement can help to identify potential risks and areas of improvement, enabling energy sector businesses to better manage their supply chain performance. Recently, there have been several procurement scandals in the firms in the energy sector such as Kengen and KPLC.

Some of the scandals are procurement of faulty meters, overpriced transformers, billing and power token scams which was as a result of institutional control. (Daily Nation 13th September, 2021). There has been a decline in financial performance due to increased cost and growth in electricity demand which resulted from purchasing agreement made with independent power producers on pricing model.

Procurement practices had much inefficiency in their operations of procurement processes and procedures. This has led to the adoption of information and communication technology in the organisation to ensure proper functioning and flow of procurement procedures (Mafini, Dhurup & Madzimure, 2020). To curb those challenges the public sectors are implementing ICT systems to enable the improvement of services for both supplier and customers in order to lower cost and increase productivity while improving the performances.

Online activities which are facilitated includes E-requisitions-sourcing, E- invoicing, E-tendering and E- advertisement they influence positive performance of procurement function. It tends to offer smooth and quick process, effective information flow, devolved

chores and resolutions on decisions, improved transparency and involved on healthier control systems (Tran, Steve & Stewart, 2021).

Organisations had many problems before they shifted from traditional procurement to digital procurement where they use internet. Since procurement function in an organization is very vital and contributes to efficiency and effectiveness. The factors which are leading to problems in E-procurement and its effectiveness supply chain management involves: Lack of expertise, Technical skills, Nature of Technology use, un availability of resources, Finance shortages and Lack of support from top managements.

Due to these factors, an organisation will still face challenges like unreliable and inaccurate data and information, inappropriate storage and poor decision making. Traditional procurement process was paper and conversation based, These practices of interfered with right quantity and quality of goods and lastly deliveries delayed, which contributed to loss of finances through fraud in organisations.

In developing world, E-procurement measures are developing in a faster rate leading to immediate benefits in the country, Korea where in excess of 60% of the country procurement, equivalent to 124 billion USD was conducted via E-procurement system. Various researchers investigated E-procurement implementation in Kenya. Mutangili, (2019), studied challenges of E-Procurement implementation in large scale manufacturers in Kenyan capital. Matano Musau and Nyaboga, (2020), studied functions influencing application of E-procurement, where they saw top management support is crucial for the E-procurement implementation success.

When E-procurement is ineffective, it leads to procurement process challenges on accomplishing its target and hinders goal achievement, the challenges includes delay in delivering goods, inconsistency on decision making, poor records keeping and distortion of

information's kept in files. According to Chen, et al. (2021) it encourages public sectors to use digital methods in their procurement processes. The need to integrate procurement function with other departments in the Organisation and to enhance transparency in funds management. Government has adopted the policy of integrated financial management System (IFMIS).

Most of the authors who conducted their studies on E-procurement implementation, and those who studied effects of E-procurement, didn't emphasize on role of information technology on supply chain management process. This study therefore investigated and bridged the knowledge gap on the influence of electronic procurement in supply performance among firms in the energy sctor in Kenya.

1.3. Purpose of the Study

1.3.1 General Objective

The common purpose of study was to evaluate the influence of E procurement on supply chain performance among firms in the energy sector in Kenya.

1.3.2 Specific Objectives

i. To determine the influence of electronic data interchange on supply chain performance of firms in the energy sector in Kenya
ii. To establish the influence of electronic material management practices on supply chain performance of firms in the energy sector in Kenya.
iii. To determine the influence of electronic tendering on supply chain performance of firms in the energy sector in Kenya.
iv. To establish the influence of supply chain integration on supply chain performance of firms in the energy sector in Kenya.

1.4.Research Questions

i. To what extent does electronic data interchange influence supply chain performance of firms in the energy sector in Kenya?

ii. How does electronic material management practices influence supply chain performance of firms in the energy sector in Kenya?

iii. To what extent does electronic tendering influence supply chain performance of firms in the energy sector in Kenya?

iv. How does supply chain integration influence supply chain performance of firms in the energy sector in Kenya?

1.5. Significance of the study

The study can greatly help both private and public sector, Government, researcher, procurement Agency, Suppliers, Customers and procurement departments among the firms in the energy sector. Researchers can benefit by getting a reference while conducting study related to this topic. Private sector will benefit from this study by gaining more knowledge on how E-procurement works. Public sector can be able to curb the challenges of E-procurement because it will guide them on how to manoeuvre through those challenges and on how to achieve procurement principles.

It can help Procurement Agencies to Implement E- procurement in public sectors easily and strengthen their act effectively on how to use digital methods. Procurement department can be able to increase the performance and productivity in an Organisation, through understanding the study on influences of using E- procurement, hence ensuring the procurement procedures and process are effective and streamlined.

1.6. Scope of Study

It focused on the influence of electronic procurement on supply management on supply chain performance of firms in the energy sector in Kenya. Specifically, the study focused on electronic data interchange, electronic material management practices, electronic tendering and supply chain integration. Data was collected from all department in the four firms in energy sector, namely Total, Kenol /Kobil, Kengen and KPLC that are listed at NSE, because it's the centre of the procurement activities and carries out the E- Procurement practices on facilitating supplies and organization performance. The focus on these firms is because they have elaborate SCM systems compared to other smaller licensed energy firms.

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview

This chapter analyses influences affecting electronic procurement in supply performance, theoretical framework, conceptual framework, empirical review, critiques,summary and gaps in research to be filled. Literature review was from journals, books and working papers from other researchers.

2.2 Theoretical Review

Framework theoretic support theories useful in research. It involves theories used in research, meaning and definitions. Explains more on theory and why problem research exists in the study. It's very advisable to understand the theory and how they assist researcher to relate with their study. (Melahi et al. 2016).

2.2.1 Value Chain Theory

This theory was initiated in 1985 by Michael porter, Value chain is the process or activity where company add value to an item, example in production, marketing and an after sale service (Benito, Petersen & Welch, 2019). The need for value is to improve the product in such a way that it will be attractive to the end customer and gain added advantage of competition. Value is a strategic business tool of planning used to identify competitive advantage arising in the business. It traces the impact made on product from start to the end process where customer receives products.

Value chain are set of activities that business performs in order to gain their primary objective and achieve the goal of profit maximization. The activities are divided into two; primary activities, this category of activities contribute directly to creation of value. The

activities under this category are; operations, sales, marketing, inbound and outbound logistics. Inbound Secondary activities supports primary activities functions example human resource, technology, procurement and infrastructures. He communicates strategies on differentiation and cost leadership which helps achieve its long-term goal.

Value chain is a source of improvement on supply chain management. Keith Oliver initiated supply chain in 1982 (Zhang, et al 2020). It is a system that contributes to upstream and downstream processes of producing valuable products and services to the intended customers. Technology is engaged in the supply chain creation, due to technology changes which usually impact on competitive advantage and making possible new configuration of value chain (Hainzer, Best & Brown, 2019).

Evolution of technology and internet has enabled information sharing such as Electronic data interchange, online tendering, ERP and electronic ordering system, which has a supported link and good relationship with customer, suppliers and third party involved. The progress of supply chain integration between firm and intended party has been struck by factors like culture differences, lack of adequate information technology, and lack of process alignments.

According to Wang, Qu & Mileski, (2018) the firms implementing efficient production, reengineering strategies and total quality management will be able to reduce costs while improving their quality on products and services, and will still increase flexibility. Implementation of value chain leads to achievement of competitive advantage. Result of achievement has enabled managers to believe additional developments may be gained through supply chain efficiencies.

Electronic integration is information partnership that focuses on producing strategic value through increasing operational efficiencies(Benito, Petersen & Welch, 2019). The Porter value chain extends the scope of supply chain towards intercompany information. Where it starts from raw materials to finished product. Zhang 2020 stated that cross value strategy has a principle of achieving competitive advantage through managing value chain.

2.2.2 Capability Dynamic Theory

Dynamic theory tries to describe Organization aptitude in purposefully unify resources to improve in performances. This theory was first formed by Gary Pisano Amy Shuen and David Teece (Sainsbury, 2020), Dynamic capability is ability of Organisation to purposefully adapt there resources base (Denrell & Powell, 2016). An organization should access the external changes adequately and timely. This requires embracing od several strategies to increase organization capability.

The organization will be in a position to integral, develop and achieve benefit of competitive benefit in the environment. Currently, trade is vibrant raging in organization activities towards customer. Organizations which achieve this will break even in this competitive world (Baden-Fuller & Teece, 2020).

For the organizations to remain competitive in this dynamic and turbulent market environment, they should apply Supply strategies. Supply Management has shifted from tradition process to Electro activities to enable be adaptable in the environment relation to technology revolution experienced. (Sainsbury, 2020). Agility in business aims to quickly respond changes in demand and supplies to ensure organization will be able to handle external forces occurring (Gupta, et al. 2019).

Sensitivity, virtually, process integration and network-based process are the four characters of agile supply chain (Baden-Fuller & Teece, 2020). Integration is working jointly

among buyer and supplier, on sharing information. Agile supply is very tricky since the business should be in a position of responding to their customers and market immediately.

There should be willingness among the supply chain members to build an atmosphere where communication is effective and information flows smoothly. (Baden-Fuller & Teece, 2020). Leverage assist to achieve effective supply chain by ensuring customers get their products on time, there is required inventory minimize idle investments and increase profitability in Business. The organization takes responsibility of assisting suppliers on how to improve product quality shorten lead-time, and improve performance through sharing of information. (Baden-Fuller & Teece, 2020).

Information technology helps communication between up and down stream, hence create a virtual supply chain means of communication which ensures information is shared among partners leading to formation of information network (Sainsbury, 2020). This theory is related to e- ordering and e- tendering to cope with vibrant market, in providing services and goods in Kenya power customer in dynamic and competitive environment. Change in marketing strategy and administrative structures, assists in processing customers' requests fast. Electronic procurement works in both external and internal components to influence dynamic processes occurring in the market for organization to achieve its operational goals hence reducing expenses and time to order and delivery duration. E- procurement been under information revolution requires to be updated often to enhance development in market. (Baden-Fuller & Teece, 2020).

2.2.3 Innovation Diffusion Theory

This theory elaborates innovation as a process of improving development in an economy, Rogers proposed innovation theory in year 1962 (Ho, 2021). Diffusion refers to process of accepting and adopting innovation in an organization. This theory is applicable in

study since it explains on how technology has changed from traditional procedures of procuring goods, services and consultants, to the digital methods where electronic procedures are preferred like E-payment, E-ordering, E- tendering. O.E.C.D. 1997 cited Al-Rahmi, et al, (2019) elaborated innovation as the process of acquiring new skills, Improved knowledge, in an economical and profitable way, which is essential in generating, implementing new markets and upgrading the products. Diffusion of innovation philosophy requires evolution technology revolution of machines, human and products so that it can improve its routine of work. Diffusion consists of four elements, i.e.; communication channel, time innovation and social system Agag and EL-Masry, 2016.

Innovation theory is attributed by the following four characteristics, they include; Compatibility, complexity, trial ability, relative advantage and observability. Diffusion theory is adopted according to how easily individual sees and experiences innovation. These characters attribute to better understanding and adoption of technology easily. According to Marak, Tiwari and Tiwari, (2019). Technology revolution has improved purchases, from paper transactions to electronic processing systems which are safer, secure, and faster and enhances performance of the procurement functions, leading to achievement of procurement principles like Transparency, fair competition and accountability. This theory assists in adoption of new ideas and technology while initiating procedures and processes in the Organization especially in procurement department.

2.2.4 Resource Based View Theory

Resource based theory (RBVT) was invented by Barney and wemer in year 1991 in heterogeneous firm's study which presented the awareness of resources barrier and entry barrier position barriers been similar(Mweru, & Maina, 2016). This theory emphasizes that the resources is key factor for an organization development and improvement, without

enough resources, Organization development will be ineffective or redundant. According to theory, resources are classified into physical capital resource, Organizational capital resource and human capital resource. Allocating of resources adequately and effectively helps the firm to achieve its goal and improve performance. Supply chain integration is collaboration of different party in an organization which assists in effective flow of communication. A supplier plays a great role in supplying essential resources in the firm and ensures continuous flow of goods in an organization.

Dyer Davis and DeWitt, (2021) states it's important to form inter organization resources since they assist in achieving firm performance as compared to constrained resources. Internal and external resources are integrated to enable achieve greater performance. According to Cruz and Haugan, (2019) the process of interacting and cooperating in order to achieve goals is refered as integration.

Mweru, & Maina, (2016) considers supply integration as tool of increasing customer and shareholder values while reducing costs, Supply integration tactic that assist firm improve its performance and be competitive while benchmarking with other related firms. The known collaboration is supplier and buyer, customer relationship, the business cannot perform their duties without involvement of customers.

This theory explains more on how supplier, customer and Organization collaborate with one another effectively, there is need of communication, understanding and elaborated procedures and rules which guides the parties involved. Dyer Davis and DeWitt, (2021) explains how supply integration links the information with suppliers, customers and other interested party involved incorporating on relationship, events, tasks, process and locations for Organization to be successful. It should ensure operations are integrated with trading partners to enhance sustainability in supply chain.

Resource based view theory assist supply chain in elimination of over challenges, and achieve the benefits like improving performance by reducing costs, increasing productivity, reducing bullwhip effects which ensures customers satisfactions, better utilization of resources, improve on quality and quantity of products, respond effectively to changes which arise, and ensure firm objective on profit maximization is achieved (Cruz and Haugan, 2019).

2.3 Empirical Review

Empirical review is based on observation, occurrences and knowledge from experiences. Where other studies conducted with related topics would replicate same result, It usually what other researchers concluded.

2.3.1 Electronic Data Interchange and Supply Chain Performance

Technology has emerged as a factor to enable businesses development and competition in the market, It ensures some benefits like saving cost, improving customer and suppliers' relationship, improve business performance, increase productivity and increase more opportunity to run new markets are achieved Huemer, Liegl and Zapletal, (2020). This study will enable an organisation to know tactics used to solve information challenges and strategies to upgrade their businesses.

Electronic data interchange has assisted organisation to deal with and eliminate all loopholes which existed in traditional methods. Traditional processes involved paperwork which was tiresome and involved inaccuracy, in accountability and hindered transparency in the process. According to Klapita, (2021) uses of online platform in evaluating, price comparison and procurement process has become efficient and have ensured transparency and accountability which reduced errors and inaccuracy.

E-procurement is carrying all procurement processes or activities online example tendering, purchasing, post purchasing review and ordering. Huemer, Liegl and Zapletal, (2020). This has eased the operation in organisation ensuring the process is transparent, accountable and standardised. EDI helps the company to get qualified suppliers who can meet their qualifications, according to goods and services demanded by the organisation. The process is conducted online through posting on organisation portal for all suppliers to bid against company requests. EDI helps in automation of procurement activities which is appropriate and available in the system throughout. Hence ensure cost reduction and accuracy of information. In the 21st century, organisations are embracing e-procurement.

Masudin and Kamara, (2017), argue that efficiency and performance in procurement department of Kakamega County Government was affected by E procurement website in availability .Above factors were contributed by inadequate resources like machines to perform the necessary activities, lack of knowledge and less skills due to lack of training. This study conducted in Kakamega county, concluded that if internet based system is used effectively, will allow all staffs to participate. Mambo 2015, indicated that Kenya government has adopted ICT in service delivery in the public and private sectors.

EDI acts as an opportunity to improve business processes and business controls direct even when challenges are expected. Yunitarini and Santoso, (2018) conducted a case study on East Africa Cement Company on sustainable procurement practices They concluded electronic procurement affect supplier payment, reduction of processing and other administration cost which includes transportation and communication. EDI also enables businesses to improve on production and satisfy customers hence achieving goal on supply chain performance

Electronic Data Interchange (EDI) is a web-based system which enables transfer of information, automation of order processing and real time transaction. This variable has enabled influence of E- procurement in an Organisation for improvement of supply chain performance. Huemer, Liegl and Zapletal, (2020) states electronic ordering as a method where requests of goods are placed,approving purchasing requisitions, placing purchasing order, receiving goods purchased using internet based software system, a technology which works effectively to improve supply chain performance. Masudin and Kamara, (2017), the system is applicable to use by all the employees in the Organisation, due to its benefit on eradicating corruption and assisting on transparency and accountability, by minimising repetitive manual process and paperwork.

In 21st century, online purchases have increased, so if organisation use E-ordering system it may boost its sales, where their customers will enjoy making orders from their respectful places without incurring transportation costs and limitation of time, thus improving supply chain performances (Yunitarini & Santoso, 2018). According to Klapita, (2021) deploying EDI in the system, ensures elimination on human errors, and streamline all procurement processes from ordering to delivery without wasting time and resources.

2.3.2 Electronic Material Management Practices and Supply Chain Performance

Organisation requires adequate materials to work effectively for smooth flow of work and continuous performance of activities, the products and services should meet the required standards. These process allows efficient flow of products from delivery step up to storage and lastly issuing (Jermsittiparsert, Namdej and Somjai, (2019). Every product purchased should be verified before it's received and invoiced. With the help of electronic material management, this process is simplified.

The benefits which are incurred when electronic material management is effectively conducted includes; data accuracy, improved quality, quantity, reduction of lead time, reduction of operational, complexity, improved delivery performance, lower costs, increased productivity, reduced inventory costs and facilitates transparency and accountability. The products are monitored throughout electronically. This assists to ensure no destruction, misuse of product when they are in excess. Tracking products assists an organisation to know exact balance without guessing (Ancheta, 2017).

According to Maggioni, Giliberti and Panunzio, (2021), the practices of electronic material management, enables the organisation to upgrade other aspects which can apply to products like scheduling production processes, fastening bill of material and maintaining level of inventory through Material Requirement Planning MRP and (MRP11). Manufacturing resource planning (MRPII) integrates manufacturing capacity with benefit of MRP. The head of procurement assigned on warehouse is able to track products electronic through installing coding software, which will count any product available in warehouse by giving numbers and assist warehouse personnel on the unavailable products for purchases (Ancheta, 2017).

It ensures goods are stocked to order, this reduces holding and ordering costs. There are some obstacles which hinder material management practices to be effective, these factors include; forgetting to order material, over pricing and under-pricing materials, late delivery of products, lack knowledge, lack of JIT strategy which is a useful approach to achieve success, lack of training, inadequate planning, lack of communication flow, poor relationship with supplier, management and shortage of finances (Yin & Ponnan, 2016).

This study emphasized on use of electronic material management practices while procuring their products to ensure tracking of products and warehouse practices are practised in Organisation. The system emerged from production management which was developed by Toyota in Japan (Yin & Ponnan, 2016). The Toyota Company used this system since they viewed it as a way of eliminating wastes, reducing of errors, controlling inventory i.e. no overstocking or understocking, reduction of costs and enhancing efficiency and effectiveness.

Material management practices, developed a concept of where the Organisation would purchase the products only when required, to ensure no idle capital exists. The system deals with production, supply and distribution in procurement system. Kenya power has these sectors in their Organisation, Where KENGEN produces power, and Kenya power procure the power while KETRACO distribute the power from KENGEN to Kenya power and finally Kenya power supplies electricity to its customers (Matano, Musau & Nyaboga, 2020).

Implementation of Electronic material management leads to continuous improvement, shorten lead time, improve material quality and accountability on material flow and ensure customer satisfaction through delivering products at the right time. Material management is involved on tracking products from suppliers to end customer, and monitoring the products stored in warehouse through coding them (Yin & Ponnan, 2016).

Traditional Material handling management had a lot of challenges, Such as Time consuming, wastage of products, poor handling of equipment and inaccuracy. Material Management refers to proper planning of materials, controlling the misuse of material and ensure their standard are not sub standardised and value matches with price and quality. (Ancheta, 2017). Objective of E- material Management is to maximise Organisation resources and providing good and services to their customers. Kenya power has improved on customer service, they supply electricity to arid and semi-arid areas. To ensure they reach

their customers timely, they use E-material management. Kenya power will be in a position to know the percentage in which their customer use electricity, they will be able to track materials like meter, and transformers and ensure accountability by employing material manager (Maggioni, Giliberti & Panunzio, (2021).

2.3.3 Electronic Tendering and Supply Chain Performance

E-procurement enhances improvement of procurement operations process and transparency of supply chain. E-tendering is an online process where all the activities of tendering are conducted (Nani & Ali, 2020). From the advertisement of tender, application of tender, bidding, technical and financial evaluation and finally issuing of an award and notifying others about completion of the award. E-tendering allows centralisation of process to help the organisation in accountability and transparency of activity hence minimising manual tendering and improve performance in supply chain-tendering process allows transparency, cost reductions, improves internal process efficiency and improves relationship with suppliers.

E-tendering offers an organisation the opportunity to obtain competitive suppliers. When tender documents are advertised online, they reach many suppliers and due to many suppliers and competition in the market, many suppliers will fear losing the award allowing an opportunity to competitive supplier applying for that bid. Allowing, collection, receipt, evaluation in addition compensation payment process on purchased goods and services. E-tendering also promotes the efficiency of supply chain management process which enables an organisation to improve its performances (Sunmola & Shehu, 2020).

Electronic tendering according to Rajab, (2018) asserts that electronic tendering invoices, e-sourcing, e-ordering, electronic authorisation and electronic payment. All the process from requisition of a product to delivery is done electronically without use of

paperwork. E-tendering provides, centralisation process in the organisation which assists on accomplishing effective supply chain management while reducing traditional tendering costs. The tendering manager starts the first stage of advertising the work online, avails the document on website after the supply bid, his shortlists the qualified bidders to continue with technical quotation and financial quotation where he gets the qualified supplier and awards him/her the contract. This process of online, facilitates satisfaction on their suppliers and customers since there is transparency reflected (Musyoki, 2019).

Procurement department are faced with many challenges like cancellation of tenders, higher charges on tenders and poor awarding on bids due to inconsistent procurement policies. Government has stepped in, on public organisation to emphasise use of policies in procurement systems to ensure transparency, timeline of work completion, satisfaction on customers and reduction of cost (Goh, 2020). Electronic tendering is an online practice used in procurement process, where all activities are conducted online from the first stage of advertisement to the last stage of issuing an award, this process tend to be transparent and accountable.

Centralised process helps organisation to improve effectiveness, accountability and supply chain management performance. It also helps in reducing traditional tendering costs. Eshitoli, (2016) explains that electronic nature on E-tender market place states business shouldn't be left behind nor miss any opportunity since they have access to email, sms alerts on tenders publishedIf supplier have good relation with the Organisation, they related or worked with before, he will be able to reflect the tenders which have been posted on their portal without difficulties on operations.

Customers work has been simplified on searching for qualified suppliers with the products and services required. The customers only post on their website the products they require, the link to communicate to them and their testimonials. It's the work of suppliers or businesses intended to provide information on products and they offer together with prices of products and any other relevant information which will be useful to the customer, the customers' work is only reviewing website for the businesses that have responded on tender. According to Nani & Ali, (2020), E-tendering is use of internet to send request to suppliers, invoices and receiving responses back to the business leading to effective supply chain management.

According to (Goh, (2020) e-tendering process to be effective, it requires registration, submission and bid evaluation processes. This process need both buyers and bidder be registered online for them to be able to access web portal of E-tendering. Without proper registration of both party, it will be impossible to work online because the buyer will not be able to publish the tender and bidder will not be able bid the document. Bid evaluation is almost the final stage, where procurement creates an evaluation committee which analyses all the bid and prepare the report to support why certain tender has won (Eshitoli, (2016). Finally, they award contract to the supplier who won the tender.

2.3.4 Supply performance and Supply chain Integration

Supply chain helps an organisation to incorporate its activities and centralise them. This is done through ensuring the organisation adopts e-procurement practices which enables open participation of all staffs and departments involved in supply chain integration. If this aspect is implemented well in an organisation, it will incur the following benefits to the organisation; Organisation is in a position to make informed decision on the qualified suppliers, standardised vendor registration firms centralise visibility of suppliers data, track

supplies performance and promote suppliers diversity (Flynn, Koufteros & Lu, 2016). Information technology allows the different parties involved in procurement process to reduce lead time, Ensure effective flow of communication, increase transparency and maintains their suppliers' relationship.

In a study by Khanuja & Jain, 2019,the role of suppliers in manufacturing sector, aimed at evaluating the supplier management role on procurement performance in East Africa breweries, it states procurement performance in East Africa breweries is influenced by supplier-buyer relationship, quality management and employee training. Study focused on maintaining the supplier collaboration on maintaining supplier collaboration and supplier training for improvement of the procurement performance. Munir, Jajja and Farooq (2020) argues that the use of internet-based web sites in an organisation assist in building value in supply chain relationships.

Firms depend largely on supplier, to provide right products at the right time, quantity, quality and costs. Suppliers tend to respond faster and timely to their customers' requests to ensure the good relationship between them exist. However, the supplier's negligence and carelessness on delaying to deliver the product on time, leads to buyers' challenges on operating business effectively. This influences on high level of buffer stock on organisation to be able to cater for supplier's uncertainty, where organisations are forced to hold costs on their stocks.

It's important for a firm to create a good relationship with their suppliers which will influence quick and fast response on delivering quality goods on time and at reasonable prices leading to achieve competitive advantage where relationship is strengthened. If there is breakdown of communication in an organisation, it will affect the success and achievement, where there will be challenges which will be influenced by distortion of information like

inaccurate demand forecasts, inefficiency resources allocations, poor relationship resulting to long lead time period and high costs due to losses incurred, when demand was high and product were unavailable and vice versa. Quick and accurate information minimises distortion of information in procurement process both internally and externally. Flynn, Koufteros & Lu, (2016) states three levels of supply Integration referring to information sharing between. Second one; semi-automated supply chain integration, lastly total automated integration.

According to Munir, Jajja and Farooq (2020) e-business technology is vital element influencing the productivity of an organisation, the urge of adopting e- commerce is influenced by some factors such as; cost reduction, customer service improvements, improves product quality and quantity required by ensuring that supplier connects their systems to do businesses. Collaboration level is a key factor, in long term relationship in firms its characterised by confidence, which ensure good Integration among firms and customers.

Supply chain integration according to Khanuja & Jain, (2019) refers to the degree to which collaboration manages intra and inter-organization process which channel partners. Supply chain integration helps Organisation to strengthens the relationship which exists among the parties working in the Organisation the most known is buyer-seller relationship. This variable enhances good understanding. Flow of communication is effective to ensure the activities have been conducted effectively to achieve the firm goals. Kang, in 2018 asserts that, Supply integration assists on improving an Organisational relationship and processes through global and real time collaboration on how to respond to changes in technology.

Information in public Organisation should be transmitted on official means like emails, fax and website which is legal and recognised for the purpose of recording and reference if need arises. Information sharing is where information is exchanged among

parties involved across the Organisation in supply chain. Information should be timely, appropriate and available whenever it's required for use (Kang et. al, 2018).

2.3.5 Supply Chain Performance

This refers to vital strategy used to enhance organisation productivity and reduces lead time (Muhoho & Makali 2020).Saniel et al (2016) examined the effects on electronic procurement under efficiency procurement on hospitals especially public. They also determined extent to which e-procurement reduces costs and prices on goods. Lastly, he argued on method used to value the money compared to the product he used at Kisii hospital and analysed. The method used included electronic methods like quotation, sourcing, and procurement. Some challenges staff faced were Lack of training, inadequate funds and inadequate machines.

Mathur, Gupta and Dangayach, (2018) conducted study on effects of electronic activities in state corporations on Kenya, they concluded personnel find it easy to get their goods through internet. Suppliers' prequalification is conducted online where document is scrutinised and posted. On their study, there were a dilemma on whether suppliers are evaluated electronically and whether employees electronically do E-auctions and location search.

Seth, Goyal and Kiran, (2017) studied factors influencing Electronic Procurement in an Organisation performance. They analysed how performance is relating with electronic payment, sourcing, information and online tendering process. The outcomes were yes and e-bidding greatly influences market shares and profitability. They concluded that electronic processes in procurement influences progressive performance of parastatals. All parastatals should embrace e-tendering, e-sourcing, e-payment, e-information to ensure effectiveness of organisation.

Every Organisation is concerned on how it can achieve competitive advantage, process of supply management assists on streamlining operations of procurement so that Organisation can achieve its goal of profit maximisation. Supply chain management refers to the right procedure of meeting customers need following right procedures. Rajak, Parthiban and Dhanalakshmi, (2021) states that supply chain management assesses tangible and intangible features in supply chain management. Online procurements leads to effectiveness of supply chain performance E- procurement helps to consolidate purchasing activities which enhances better services from suppliers, reduction of costs, flow of communication and increases productivity.

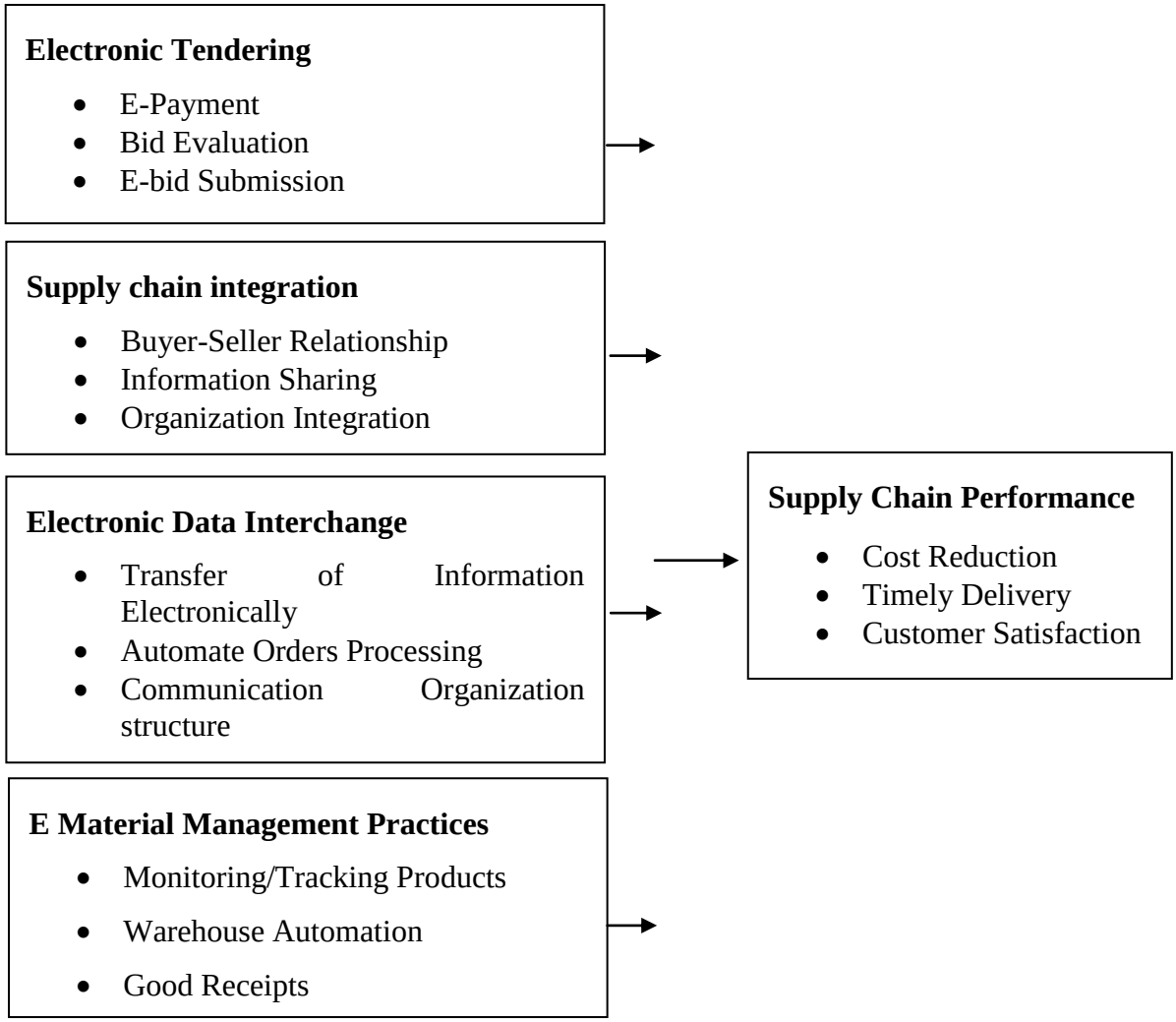
According to Jermsittiparsert, Namdej and Sriyakul, (2019) e- procurement allows Organisation to respond faster to competition of fresh market entrants and enhances winning of new business. Poor procurement practices causes public and private sectors to incur economic losses due to poor quality of product, Inconsistent flow of goods and late deliveries. Many operational and tactical benefits generated by procurement department are through employment of upgraded information technology systems, which enable activities like E-action, e-RFT, e- catalogues (Seth, Goyal and Kiran, 2017).

2.4 Conceptual Framework

It's a graphically or diagrammatically showing relationship which exist among independent and dependent variables. The diagram below, dependent variable is indicated on right side and independent is indicated on left side. Independent variables works on their own to achieve the impact on dependent variable. Researcher used conceptual framework because it helps them to research question clarification and objectives.

FIGURE 1

Conceptual Framework



2.4.1 The Variable Operationalization

Information is summarized on Table 1below. It gives weight on Variables using a measurable attribute. In this 5likert scale was in use.

TABLE 1

Operationalization of Study Variables

Variables Type	Sub Variables	Indicators	Measurement Level	Methods Of Data Collection
Dependent	Supply chain management	Level of satisfaction Period of lead time Level of satisfaction Level of effectiveness	Ordinal Ordinal Ordinal Ordinal	Questionnaire
Dependent	Competence employment	Training Skills available	Ordinal Ordinal	Questionnaire
Independent	E-tendering	E-payment E-sourcing E-bid Submission	Ordinal Ordinal	Questionnaire
Independent	EDI	Information sharing Automation of order	Ordinal	Questionnaire
Independent	Supply chain integration	Integration Organisation Buyer seller relationship	Ordinal	Questionnaire

2.5 Critique of Reviewed Literature

Study conducted on effects of E-procurement application on software used like E-auctions, E-sourcing, E-invoicing and E-archiving tend to increase the organisation performance while reducing the time taken on processing the procurement activity (munubi.et.al...2017).The study focused on famous supermarket in Kenya (Tuskys, Naivas, uchumi) in Nairobi County but study specify on Energy Company. The improvements which are observed in many public parastatals are influenced by use of electronic procurement, they also lead to high performance improvement Kioko &Mwangangi 2017. The studies focused on a different context and not the energy sector.

A study conducted by Khanuja & Jain, 2019. Under manufacturing sectors in Kenya on suppliers' management role on procurement performance aimed to evaluate role of supplier management towards procurement performance on East Africa breweries, its objectives were suppliers to be able to relate with other departments well, increase harmony, improve collaboration and increase training of suppliers. Kang, 2018, asserts that, supply Integration assists improving

Organisational relationship and processes through global and real time collaboration on how to respond to changes in technology. Oteki, (2019) studied on influence of E-procurement performance on Energy sectors. Namusonge, Shalle and Fozie 2016 studied effects of electronic supplier's management practices on regulation implementation in public corporation. Studies have been carried out on E-procurement both on public and private sectors but have not generalised on the firms in the energy sector as this study elaborates.

2.6 Summary

Information Technology has become a backbone element of development for any organisation that seeks to outshine on its performance. Technology evolution has a lot of benefit in an organisation like low operation cost, increase productivity, increase profit, shorten lead time, increase sales and improves on their products. E-procurement ensures effectiveness on supply chain management process. These is process of purchasing goods as services through internet based systems. Where customers prefer it due to variety of product displayed, supplier information and easy retrieval of documents.

E-procurement enables organisation to be very competitive in the market. When practices of E-procurement is conducted well it leads to achievement of procurement goal on profit maximisation and achievement of procurement principles; Transparency, Accountability, Shorter lead time, Improve productivity, increase sales and improve and innovate their products. These are made efficient through staff training, following procurement rules and regulations and ensuring there is enough resources to carry out the process.

Procurement department works hard to meet their goals but they have challenges which hinders its success like delivery of poor quality goods, price inflation, lack of resources required, unqualified staffs, inconsistent procurement policies which may lead to repetition of tendering, delay of project, completion, and poor recording, Most of these factors leads to adoption of Electronic procurement.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

Chapter three elaborates how the study was supported, concerned with data collection, methods and procedures used. Research is a set of stages and phases followed to carry out study. Methodology research has the following subsectors; Data used to collect information, Instrument of testing reliability and validity, methods of analysing data , Research ethics required, research design and target population used.

3.2 Research Design

This study used descriptive research design, where they measures variables as they exist or as they are. According to Sharma, (2017) design research is most appropriate method to use, because it gathers qualitative information and generates appropriate conclusion with respect to the research questions. Research design is process of how one is supposed to answer the research questions. Good research design should have a clear definition, purpose and there should have consistency between research question and proposed research methods according to Kazdin, (2021) stated that design was reliable type because it had sufficient capability to minimise biasness and ensuring reliability of data's, Quantitative method was used. According to Rich-Edwards, et al. (2018), quantitative method is suitable to test hypotheses through rigorous statistical tests.

3.3 Target Population

Rich-Edwards, et al. (2018) stated population as people, item and event that was of interest to the researchers on what he wishes to study. The stuy targeted firms in the energy sector that were listed at Nairobi Securities Exchange, that is Kenya Power Ltd, Kengen Ltd, KenolKobil Ltd and Total Kenya Ltd. Different departments were used especially those

linked to the procurement directly or indirectly. According to Sharma, (2017) target population should not be homogenous but be based on traits required by the researcher. The respondents from the Procurement, Finance, Administration, Information Technology, Human Resource and Marketing departments of these firms was used.

TABLE 2

Target Population

Departments	**Target Population**	**Percentage%**
Procurement	65	25%
Finance	55	21%
Administration	50	20%
Information Technology	35	14%
Human Resource	30	12%
Marketing	21	8%
Total	256	100%

Source: HR Records of Kenya Power Ltd, Kengen Ltd, KenolKobil Ltd and Total Kenya Ltd.

3.4 Sample Frame

A sample frame involves physical selection from target population, from all active members of different units. In the study sample size was conducted from different departments of the four firms including from the procurement, finance, administration, Information technology (IT), human resource and marketing department. They all have a link with procurement department either direct or indirect. The study therefore targeted a total of

256 respondents from these firms. According to Schoonenboom & Johnson, (2017) defines sample frame as a set of elements in the population that adequately represents the entire group, assisting researchers to give accurate figure of the population as a whole, putting the aspects of study interest into consideration.

3.5 Sample size and Sampling methods

Sample size is portion selected from whole population to represent them in carrying out an activity. This small group selected contain all characters and features of the entire populace, hence the result will be generalised to be of the whole population. According to Berndt, (2020) explains the purpose of sampling was to know the features of whole population based on characteristic of selected group. Sharma, (2017) defines sampling as a small group of as given population selected and analysed to find out the attributes of the whole population. Berndt, definition is almost similar with that of Sharma which defines sample as a smallest subset of population that represent the entire population. Stratified method was appropriate for the study since the entire population of employees was not used.

Rich-Edwards, et al. (2018) states that stratified sampling produces accurate parameters of the overall population which was not used. Simple sampling provides equivalent chance to item in the selected sample population Sampling method was preferred because it reduces biasness on result and enhances accuracy in the entire population. Population was stratified into small strata of different department across the four firms. A sample size of 30%, in accordance with Mugenda and Mugenda (2009) as well as Sharma (2017) was adopted as indicated in Table 3.

TABLE 3

Sample Size

Departments	Target Population	30%	Sample Size
Procurement	65	30%	20
Finance	55	30%	17
Administration	50	30%	15
Information Technology	35	30%	11
Human Resource	30	30%	9
Marketing	21	30%	6
Total	**256**	**30%**	**77**

3.6 Instrumental Research

Research instrument which will be used is questionnaires that are self-administered with both structured and semi-structured items relating to the study objectives as its major data collection technique. Questionnaires are popular because they collect data effectively and allows respondents express a variety viewpoint on the topic at hand. The data collected through surveys is free of bias and researcher influence, resulting in reliable and trustworthy statistics.

3.7 Instruments Reliability and Validity

Pilot study was necessary because it tests how consistency and validity of questionnaires. Wright, et al. (2016) stated that pilot tests purpose was to test instrumental reliability used in collecting data. According to Kazdin, (2021) the test is regarded perfect and reliable if it provides exact and same result when repeated. When carrying out pilot study the researcher is faced by threats of validity and reliability, he cannot be able omit them but s/he can minimise them. Validity was originated from Latin word “Validus” which means strong, power and legitimacy. The validity of instrument is divided into two groups; external

and internal validity. Internal validity refers to a level in which change of dependent variable is independent variable.

Internal validity refers to degree where independent variable led to change of dependent variable while relationship existing between independent and dependent variable during an experiment is referred to external validity. Schoonenboom & Johnson, (2017) stated that validity is mandatory to all studies carried out. Aim of carrying out pilot study was to test study validity . Researcher conduct validity to determine usefulness and accuracy of questionnaires and estimate the period of time questionnaire will take to be completed for analysing and accuracy.

According to Sharma, (2017) validity of instrument is how accurate the instrument is when collecting data in the field. Berndt, (2020) stated that content validity specifies the degree measurement of what is supposed to be measured in the study. In this study validity was ensured by supervisor and researcher by reviewing questionnaire carefully. The expert and professionals in procurement department discussed on how to verify the instrument whether they contain descriptive sample.

Instrument Reliability in a study is how consistency result could be, the data is reliable if other researchers can depend on it. The study used a questionnaires administered to the respondent, where questions on dependent variables are constructed, to each respondent, the result was tested again by experts to ascertain accuracy of information. Sharma, (2017) reliability of instrument as ability of instruments to provide consistency and trustworthiness result when the process is repeated severally. In this study Cronbach's alpha was used to measure the variables used in respondent questionnaire, since it's referred as suitable method for measuring stability.

Cronbach's Alpha: Formula $a = k * \bar{c}/\bar{v}_{+(k-1)\bar{c}}$

Where K= is the item scale

$\bar{c}$= is average of all covariance

$\bar{v}$= it's the variance average of each item

a = Cronnbach's alpha

Berndt, (2020) argued that general reliability of coefficients is excellent when it's around 0.9 and very good when value is around 0.8 and adequate when it's 0.7. When a coefficient is higher, items in scale tends to measure same models, and when item is independent Cronbach's alpha is Cronbach's alpha is i.e. α = 0

3.8 Data Collection Procedure

It's process in collecting data or information required especially for a certain study. A researcher collects data on variables to identify the accuracy and reliable information on their studies. Methods of collecting data's are Primary and secondary and are used in most studies. This refers to information gathered by the researcher for the purposes of researcher problems, these are the first-hand information gathered by researcher, it's a raw data which represents official opinions studied for study needs only. Primary data are not tampered nor biased and that's the reason many researchers prefer it.

The study used a questionnaire means of collecting information because it's cheaper, easy to administer, fairly and efficient. These questionnaires consisted of structured and unstructured questions and Likert rating scales used for some questions where choices are provided, the respondents are only required to select appropriate answer according to them. According to Kazdin, (2021) closed ended question collects only viable and measurable data while open ended question respondent has a freedom of answering questions according to his

understanding and knowledge. Secondary data collection is existing information or known information even before the research was conducted. This study also used secondary data. Which was obtained from company website, academic journal, and relevant literature review from other studies, magazines and books.

3.9 Data Analysis and Processing

This study analysed and presented its data using quantitative methods. Berndt, (2020) defines data analysis as a process of interpreting collected information into an understandable way.Quantitative data uses numbers and is measured hence it must be calculated out. The quantitative data was analysed using descriptive method, where data collected was analysed completely, verified, coded and arranged for final process of testing it using (SSPSS Version) Statistical packages for social scientist.

Schoonenboom & Johnson, (2017) stated that statistical packages for social scientists holds large amount of data's due to its capabilities and can handle any size of data. Data presentation according to Berndt, (2020) was defined as a process of summarising, arranging, analysing, organising and communicating information with the help of different tools like graphs, charts and tables.

3.9.1 Inferential Analysis

The study will also use correlation and multiple linear regression model, which enables the researcher to measure the degree of independent and dependent variable and how they relate to each other. The analysis will also assist researcher to test the hypothesis and in this study, hypothesis will be tested at 95% level of confidence which lead to use of significance level of 5%. Analysis of variance helps the researcher to compare more than three variables. The study used a multiple regression model to test relationship which is there between the multiple variable as shown:

$Y= ß_0+ ß_1X_1+ ß_2X_2+ ß_3X_3+ ß_4X_4+ µ$

Y= Dependent Variable, Supply chain Performance

ß0 = Constant Coefficient

X_1 = Electronic Tendering

X_2 = Supply Chain Integration

X_3 = Electronic Data Interchange

X_4 = E- Material Management Practices

µ = Error term

$ß_1+ ß_2+ ß_3+ ß_4$ = Regression coefficient of the four variable.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION

4.1 Introduction

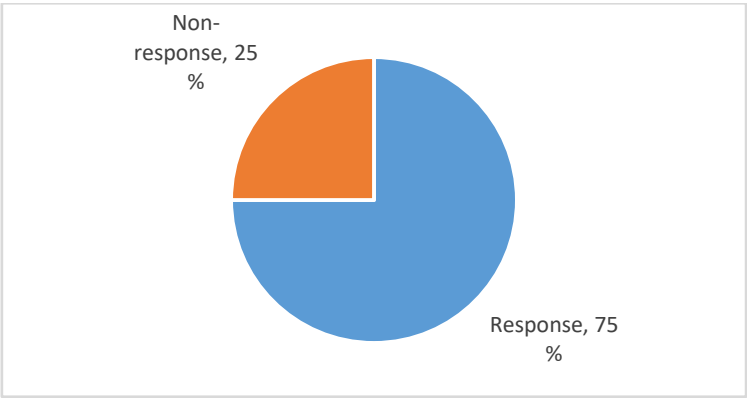
The chapter gives the survey findings, its explanation, discussion and colloborations. The chapter presents and explains the findings of the survey data. This is done per objective from descriptive to inferential statistics.

4.2 Response Rate

A total of 77 respondents from the Procurement, Finance, Administration, Information Technology, Human Resource and Marketing departments of the 4 energy firms were targeted out of which 58 of them responded. This gae a response rate of 75% which is considered good according to Alvesson and Skoldberg (2017) as shown in Figure 2.

FIGURE 2

Response Rate



4.3 Pilot Test Results

The adopted tool was pretested for reliability and validity before being used in the main survey. The study tested for reliability through internal consistency measure of

Cronbach Alpha at a threshold of 0.7. On the other hand, validity was tested through experts opinion. The results in Table 4 indicate that all the variables surpassed the reliability threshold of 0.7 hence they were reliable.

TABLE 4

Reliability Test Results

Variable	Cronbach Alpha	Number of Items	Rule	Decision
Electronic Data Interchange	0.773	5	> than 0.7	Reliable
Electronic Material Management	0.787	5	> than 0.7	Reliable
Electronic Tendering	0.836	5	> than 0.7	Reliable
Supply Chain Integration	0.758	5	> than 0.7	Reliable
Supply Chain Performance	0.864	5	> than 0.7	Reliable

4.4. Respondent's Demographic Characteristics

The study described the respondnt's work experience as well as level of education. Work experience is important in understanding the respondent's institutional knowhow in regard to the study concept. On the other hand, the level of education helps in interpretation and giving reliable answers. The results are presented in Table 5.

TABLE 5

Respondent's Demographic Characteristics

Demographic Factor	Category	Frequency	Percent
Education	Secondary	1	1.7
	Diploma	24	41.4
	University	33	56.9
	Total	58	100
Experience	Below 5 Years	7	12.1
	6 to 9 Years	22	37.9
	10 Years and above	29	50
	Total	**58**	**100**

The result sin Table 5 indicates that majority of the respondents, 56.9% had a university degree while onl 1.7% had a secondary level of education. This implies that they were literate hence able to give valid responses. It was also established that up to 50% of the respondents had a high work experience of 10 years and above. Only 12.1% had a work experience below 5 years to mean that there was a high level of institutional knowhow among the respondents hence able to understand the organizational e-procurement procedures.

4.5 Descriptive Findings and Analysis

The study used likert scale ratings to describe the study questions. This section gives the summary of the likert scale questions using mean and standard deviation.

4.4.1 Descriptive Findings of Electronic Data Interchange

The first objective was to determine the influence of electronic data interchange on supply chain performance of firms in the energy sector in Kenya. The likert scale ratings are presented in Table 6.

TABLE 6

Descriptive Findings of Electronic Data Interchange

Statement	Mean	Standard Deviation
EDI facilitates services faster to the company, customers and suppliers	4.14	0.89
EDI minimizes errors in data entry and improves accounts working in the company.	4.40	0.72
EDI ensure transparency in whole process of procurement procedures.	4.40	0.90
EDI improves supply chain performance and increase visibility in the company.	3.90	1.02
EDI authenticate data's and ensures errors reflected are rectified immediately	3.84	1.02
Average	**4.13**	**0.91**

The findings in Table 6 above indicate that majority of the respondents agreed that EDI facilitates services faster to the company, customers and suppliers (Mean = 4.14), EDI minimizes errors in data entry and improves accounts working in the company (Mean = 4.40), EDI ensures transparency in whole process of procurement procedures (Mean = 4.40).

There was also an agreement that EDI improves supply chain performance and increase visibility in the company (Mean = 3.90) and that EDI authenticate data's and ensures errors reflected are rectified immediately (Mean = 3.84). Overall there was an agreement that EDI can improve supply chain performance among the firms in the energy sector (Mean = 4.13).

4.4.2 Descriptive Findings of Electronic Material Management

The second objective was establish the influence of electronic material management practices on supply chain performance of firms in the energy sector in Kenya. The likert scale ratings are presented in Table 7.

TABLE 7

Descriptive Findings of Electronic Material Management

Statement	Mean	Standard Deviation
The firm's stock level are enhanced through the use of electronic Material Management practices.	3.95	0.89
EMM can make great improvements on transportation and logistics in the company under supply chain performance	3.93	1.01
With EMM, the company can be able to reduce capital expenses by ensuring there is no a lot of idle stock but goods supplied meets customer demands	3.90	0.93
Electronic material management practices eliminate duplicate handling of materials within the company's supply chain performance	4.09	0.98
Electronic material management practices enable the company to facilitate the right type and quantity are acquired in the first place.	3.86	1.05
Average	**3.94**	**0.97**

The findings in Table 7 indicated that the respondents agreed that their firm's stock level are enhanced through the use of electronic Material Management practices (Mean = 3.95), EMM can make great improvements on transportation and logistics in the company under supply chain performance (Mean = 3.93) and that with EMM, the company can be able to reduce capital expenses by ensuring there is no a lot of idle stock but goods supplied meets customer demands (Mean = 3.90).

The respondents also agreed that Electronic material management practices eliminate duplicate handling of materials within the company's supply chain performance (Mean = 4.09) and that Electronic material management practices also enable the company to facilitate the right type and quantity are acquired in the first place (Mean = 3.86). Overall, there was an agreement that Electronic material management can improve supply chain performance (Mean = 3.94).

4.4.3 Descriptive Findings of Electronic Tendering

The third objective was to determine the influence of electronic tendering on supply chain performance of firms in the energy sector in Kenya. The likert scale ratings are presented in Table 8.

TABLE 8

Descriptive Findings of Electronic Tendering

Statement	Mean	Standard Deviation
E tendering process enables the company to improve transparency in supply chain performance	4.07	1.01
E tendering helps you to reduce costs associated with the traditional tendering process thus improves supply chain performance	3.97	1.06
E tenders increase the speed of the whole tendering process thus improves supply chain performance of the company	3.84	1.35
Adopting e Tendering helps to standardize then buying process throughout the supply chain management of the company	3.97	1.21
There is less scope of manual errors during the e-tendering process in supply chain management of the company	3.76	1.06
Average	**3.92**	**1.14**

The study findings indicated that there was an agreement that E tendering process enables the company to improve transparency in supply chain performance (Mean = 4.07), E tendering helps you to reduce costs associated with the traditional tendering process thus improves supply chain performance (Mean = 3.97) and that E tenders increase the speed of the whole tendering process thus improves supply chain performance of the company (Mean = 3.84).

The respondents also agreed that adopting e Tendering helps to standardize then buying process throughout the supply chain management of the company (Mean = 3.97) and that there is less scope of manual errors during the e-tendering process in supply chain management of the company (Mean = 3.76). Overall, there was an agreement that e-tendering improved suppl chain performance (Mean = 3.92).

4.4.4 Descriptive Findings of Supply Chain Integration

The fourth objective was to establish the influence of supply chain integration on supply chain performance of firms in the energy sector in Kenya. The likert scale ratings are presented in Table 9.

TABLE 9

Descriptive Findings of Supply Chain Integration

Statement	Mean	Standard Deviation
There is higher quality vendor pool withsupply chain integration in the company supply chain performance	3.97	1.12
Through supply chain integration transparency and visibility in the company supply performance	3.95	1.13
The company is benefiting from increased flexibility of having effective supply chain integration.	4.03	0.99
Supply chain integration ensures the company is sustainable in supplies and procurement functions and information delivered is accurate.	4.02	0.96
Supply chain integration in the company in leads to increased collaboration with suppliers.	4.00	1.04
Average	**3.99**	**1.05**

It was determined that the respodnents agreed that there is higher quality vendor pool with supply chain integration in the company supply chain performance (Mean = 3.97), through supply chain integration transparency and visibility in the company supply performance (Mean = 3.95) and that the company is benefiting from increased flexibility of having effective supply chain integration (Mean = 4.03).

The respondents also agreed that supply chain integration ensures the company is sustainable in supplies and procurement functions and information delivered is accurate (Mean = 4.02) and that supply chain integration in the company in leads to increased collaboration with suppliers (Mean = 4.00). Overall, there was an agreement that supply chain integration enhanced supply chain performance of the firms in the enrgy sector (Mean = 4.00).

4.4.5 Descriptive Findings of Supply Chain Performance

The study described the supply chain performance of firms in the energy sector in Kenya. The likert scale ratings are presented in Table 10.

TABLE 10

Descriptive Findings of Supply Chain Performance

Statement	**Mean**	**Standard Deviation**
Effectiveness	4.29	0.92
Customer satisfaction	4.24	1.01
Cost minimization	4.12	1.04
Quality Product	4.21	0.81
Short Leadtime	4.47	0.50
Average	**4.33**	**0.81**

Key: 5 = Above 20% ; 4= Between 13% - 20% ; 3 =Between 5% - 12% ; 2 = Between 1% - 4% ; 1 =Not at all

The resulst indicated that majority of the respondents indicated that their firms recorded an increase ein effectiveness by between 13% and 20% (Mean = 4.47). (Mean = 4.29). There was also an increase in customer satisfaction by between 13% and 20% (Mean = 4.24), a decrease in costs as well as leadtime by between 13% and 20% (Mean = 4.12). The quality of products also increased by between 13% and 20% (Mean = 4.47). Overall, there was an improvement in supply chain performance by an average of between 13% and 20% (Mean = 4.33).

4.6 Correlation Analysis

The relationship between the research variables was established using a correlation analysis. The Pearson correlation coefficient was utilized in this investigation to determine the relationship between the variables. A correlation analysis, according to Kumar (2011), spans from -1 to +1 and shows the direction and degree of the association between variables. The results for the correlation analysis are presented in Table 11.

TABLE 11

Correlation Analysis

		Electronic Data Interchange	Electronic Material Management	Electronic Tendering	Supply Chain Integration	Supply Chain Performance
Electronic Data Interchange	Pearson Correlation	1				
Electronic Material Management	Pearson Correlation	.267*	1			
	Sig. (2-tailed)	0.043				
Electronic Tendering	Pearson Correlation	.496**	.495**	1		
	Sig. (2-tailed)	0.000	0.000			
Supply Chain Integration	Pearson Correlation	.597**	0.186	.558**	1	
	Sig. (2-tailed)	0.000	0.161	0.000		
Supply Chain Performance	Pearson Correlation	.667**	.499**	.584**	.605**	1
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	
	N	58	58	58	58	58

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

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

The study findings indicated that Electronic Data Interchange was positively and significantly associated with supply chain performance of the firms in the energy sector (r = 0.667: P-Value < 0.05). This implies that an increase in adoption of Electronic Data Interchange would lead to a significant improvement in supply chain performance of the firms in the energy sector. The findings are consistent with that of Klapita (2021) who argues EDI has eased the operation in organisation ensuring the process is transparent, accountable and standardised. EDI helps the company to get qualified suppliers who can meet their qualifications, according to goods and services demanded by the organisation.

The process is conducted online through posting on organisation portal for all suppliers to bid against company requests. EDI helps in automation of procurement activities which is appropriate and available in the system throughout. Hence ensure cost reduction and accuracy of information. In the 21st century, organisations are embracing e-procurement.

The study findings also established that indicated that Electronic Material Management was positively and significantly associated with supply chain performance of the firms in the energy sector ($r = 0.499$: P-Value < 0.05). This implies that an increase in adoption of Electronic Material Management would lead to a significant improvement in supply chain performance of the firms in the energy sector. This is consistent with the findings by Maggioni, Giliberti and Panunzio, (2021) that the practices of electronic material management, enables the organisation to upgrade other aspects which can apply to products like scheduling production processes, fastening bill of material and maintaining level of inventory through Material Requirement Planning MRP and (MRP11).

It is also consistent with the findings by Yin and Ponnan (2016) that EMM ensures goods are stocked to order, this reduces holding and ordering costs. There are some obstacles which hinder material management practices to be effective, these factors include; forgetting to order material, over pricing and under-pricing materials, late delivery of products, lack knowledge, lack of JIT strategy which is a useful approach to achieve success, lack of training, inadequate planning, lack of communication flow, poor relationship with supplier, management and shortage of finances (Yin & Ponnan, 2016).

The study findings further showed that Electronic Tendering was positively and significantly associated with supply chain performance of the firms in the energy sector ($r = 0.584$: P-Value < 0.05). This implies that an increase in adoption of Electronic Tendering would lead to a significant improvement in supply chain performance of the firms in the

energy sector. The findings are not consistent with that of Eshitoli, (2016) who stated that electronic tendering is an online practice used in procurement process, where all activities are conducted online from the first stage of advertisement to the last stage of issuing an award, this process tend to be transparent and accountable. Centralised process helps organisation to improve effectiveness, accountability and supply chain management performance. It also helps in reducing traditional tendering costs.

Lastly, it was demonstrated that The study findings further showed that Supply Chain Integration was positively and significantly associated with supply chain performance of the firms in the energy sector ($r = 0.605$: P-Value < 0.05). This implies that an increase in adoption of Supply Chain Integration would lead to a significant improvement in supply chain performance of the firms in the energy sector.

The findings are consistent with that of a study by Khanuja and Jain (2019) who argued that supply chain integration helps organisation to strengthens the relationship which exists among the parties working in the Organisation the most known is buyer-seller relationship. This variable enhances good understanding. Flow of communication is effective to ensure the activities have been conducted effectively to achieve the firm goals. Kang, in 2018 asserts that, Supply integration assists on improving an Organisational relationship and processes through global and real time collaboration on how to respond to changes in technology.

4.7 Regression Model Diagnostic Tests

Before utilizing an ordinary least square regression model to assess the study hypotheses, the study first performed diagnostic tests. The tests included those for autocorrelation, heteroskedasticity, multicollinearity and normality. The test results are shown in the subsections that follow.

4.7.1 Normality Test

The bell shape of the data, which is a representation of normalty, is required by the assumption of a ordinary linear regression model. Non-normally distributed data would always produce erroneous findings and would not be appropriate for parametric tests. As a result, the Kolmogorov-Smirnova test was used in the study to verify this. The null hypothesis in the Kolmogorov-Smirnova (K-S) test is that the data are normally distributed, while the alternative hypothesis is that the data are not. The results presented in Table 12 indicated that the data was normally distributed (P-value > 0.05).

TABLE 12

Kolmogorov-Smirnova (K-S) test of Normality

	Kolmogorov-Smirnova			**Shapiro-Wilk**		
	Statistic	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
Supply Chain Performance	1.150	58	0.063	1.956	95	0.079
Lilliefors Significance Correction						

4.7.2 Multicollinearity Test

The presence of multicollinearity indicates a situation in which the predictor variables have a correlation of greater than 0.8. When they are, it produces erroneous findings. It is impossible to predict a relationship between the independent and dependent variables using such data. Through the Variance Inflation Factor (VIF) approach, which accepts VIF values under 10, the study checked for multicollinearity. The result sin Table 13 indicate that all the predictor variables had a VIF value below 10 as recommended hence there was absence of multicollinearity.

TABLE 13

Variance Inflation Factor (VIF) Test of Multicollinearity

	Collinearity Statistics	
	Tolerance	**VIF**
Electronic Data Interchange	0.599	1.669
Electronic Material Management	0.737	1.357
Electronic Tendering	0.514	1.945
Supply Chain Integration	0.539	1.854
Dependent Variable: Supply Chain Performance		

4.7.3 Heteroskedasticity

If the variance is constant and the error terms are independent, this is known as heteroskedasticity. In this test, the Breusch-Pagan approach was employed, in which the absence of heteroskedasticity is shown by a significance value of the probability chi square larger than 0.05. According to the findings in Table 14, the null hypothesis of constant variance was not rejected since the Prob > Chi2 value was (0.075 > 0.05). Therefore, the data was suitable to run an OLS regression without violating this assumption.

TABLE 14

Breusch Pagan test of Heteroskedasticity

H_o: Constant variance	
$Chi^2(1)$	6.754
Prob > Chi^2	0.075

4.7.4 Autocorrelation

OLS also makes the assumption that the regression's error terms shouldn't be associated (Absence of autocorrelation). The error term of the regression had to be

uncorrelated in order for autocorrelation to occur. The Durbin Watson test of autocorrelation was performed in the study, and a result greater than 2 showed the presence of serial autocorrelation. The absence of autocorrelation in the data is indicated by a value between 1.5 and 2.0. The results presented in Table 15 indicate absence of autocorrelation since the DW value was between 1.5 and 2.0.

TABLE 15

Durbin Watson Test of Autocorrelation

Durbin-Watson
1.563

4.8 Regression Analysis

To determine the influence of E procurement on supply chain performance among firms in the energy sector in Kenya , a multiple regression model, as shown in the subsections was adopted. The results in Table 16 indicate the coefficient of determiannтion which implies that up to 62.1% of the variation in supply chain performance of the firms in the energy sector can be explained by Electronic Data Interchange, Electronic Material Management, Electronic Tendering and Supply Chain Integration.

TABLE 16

Regression Model Summary

R	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
.788a	0.621	0.593	0.24875

Predictors: (Constant), Electronic Data Interchange, Electronic Material Management, Electronic Tendering, Supply Chain Integration

In order to establish the significance of the regression model used, Analysis of Variance (ANOVA) was used. The ANOVA results are presented in Table 17 indicate that the F statistic value was significant (F = 21.756, P-Value = 0.000 < 0.05) which implies that the overall regression model was significant.

TABLE 17

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	5.385	4	1.346	21.756	.000
Residual	3.279	53	0.062		
Total	8.664	57			

Dependent Variable: Supply Chain Performance

Predictors: (Constant), Electronic Data Interchange, Electronic Material Management, Electronic Tendering, Supply Chain Integration

To establish the beta coefficients, constant and their significance, the regression coefficient results were established in Table 18.

TABLE 18

Regression Model Coefficients

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	1.79	0.294		6.087	0.000
Electronic Data Interchange	0.295	0.085	0.378	3.462	0.001
Electronic Material Management	0.155	0.051	0.299	3.04	0.004
Electronic Tendering	0.052	0.063	0.099	0.838	0.406
Supply Chain Integration	0.126	0.054	0.268	2.33	0.024

Dependent Variable: Supply Chain Performance

The regression model results indicate that Electronic Data Interchange has a positive and significant effect on supply chain performance of the firms in the enegy sector in Kenya

(β = 0.295 ; P-Value < 0.05). This implies that a unit increase in Electronic Data Interchange leads to a significant improvement in supply chain performance of the firms in the enegy sector in Kenya by 0.295 units. The regression model results also indicated that Electronic Material Management has a positive and significant effect on supply chain performance of the firms in the enegy sector in Kenya (β = 0.155 ; P-Value < 0.05). This implies that a unit increase in Electronic Material Management leads to a significant improvement in supply chain performance of the firms in the enegy sector in Kenya by 0.155 units.

The effect of Electronic Tendering on supply chain performance of the firms in the enegy sector in Kenya was established to be positive but not significant (β = 0.052 ; P-Value > 0.05). This implies Electronic Tendering has no significant association with supply chain performance of firms in the energy sector in Kenya. The regression model results also indicated that Supply Chain Integration has a positive and significant effect on supply chain performance of the firms in the enegy sector in Kenya (β = 0.126 ; P-Value < 0.05). This implies that a unit increase in Supply Chain Integration leads to a significant improvement in supply chain performance of the firms in the enegy sector in Kenya by 0.126 units.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The study established the influence of E procurement on supply chain performance among firms in the energy sector in Kenya. The specific focus was to determine the influence of electronic data interchange on supply chain performance of firms in the energy sector in Kenya, establish the influence of electronic material management practices on supply chain performance of firms in the energy sector in Kenya, determine the influence of electronic tendering on supply chain performance of firms in the energy sector in Kenya and establish the influence of supply chain integration on supply chain performance of firms in the energy sector in Kenya. A summary of the study findings, conclusions, recommendations as well as areas for further research are all covered in this chapter. In the summary of the findings, discussions of the findings are also presented whereby comparison with other studies is made.

5.2 Summary of the Findings

The study gathered original data from the four companies in Kenya's energy sector to accomplish the study's goals. The study included both descriptive and inferential analyses using primary data collected from the businesses. Mean, Pearson correlation, and regression analysis were used to evaluate the data in both descriptive and inferential ways. This section provides a summary of the results. The results for each aim are also discussed in this section.

5.2.1 Electronic Data Interchange and Supply Chain Performance

The first objective of the study was to determine the influence of electronic data interchange on supply chain performance of firms in the energy sector in Kenya. The

descriptive findings indicated that the respodnents agreed that EDI facilitates services faster to the company, customers and suppliers, minimizes errors in data entry and improves accounts working in Kenya power company, ensures transparency in whole process of procurement procedures, improves supply chain performance and increase visibility in Kenya power.

Correlation results indicated that Electronic Data Interchange was positively and significantly associated with supply chain performance of the firms in the energy sector meaning that an increase in adoption of Electronic Data Interchange would lead to a significant improvement in supply chain performance of the firms in the energy sector. Regression findings established that an increase in Electronic Data Interchange leads to a significant improvement in supply chain performance of the firms in the enegy sector in Kenya.

The findings are consistent with that of Klapita (2021) who argues that uses of online platform in evaluating, price comparison and procurement process has become efficient and have ensured transparency and accountability which reduced errors and inaccuracy. Huemer, Liegl and Zapletal (2020) also stated that EDI has eased the operation in organisation ensuring the process is transparent, accountable and standardised.

EDI helps the company to get qualified suppliers who can meet their qualifications, according to goods and services demanded by the organisation. The process is conducted online through posting on organisation portal for all suppliers to bid against company requests. EDI helps in automation of procurement activities which is appropriate and available in the system throughout. Hence ensure cost reduction and accuracy of information. In the 21st century, organisations are embracing e-procurement.

5.2.2 Electronic Material Management Practices and Supply Chain Performance

The second objective was establish the influence of electronic material management practices on supply chain performance of firms in the energy sector in Kenya. The descriptive findings indicated that the respondents agreed that their firm's stock level are enhanced through the use of electronic Material Management practices, EMM can make great improvements on transportation and logistics in the company under supply chain performance, with EMM, the company can be able to reduce capital expenses by ensuring there is no a lot of idle stock but goods supplied meets customer demands, Electronic material management practices eliminate duplicate handling of materials within the company's supply chain performance and also enable the company to facilitate the right type and quantity are acquired in the first place.

Correlation findings indicated that Electronic Material Management was positively and significantly associated with supply chain performance of the firms in the energy sector implying that an increase in adoption of Electronic Material Management would lead to a significant improvement in supply chain performance of the firms in the energy sector. Regression findings indicated that an increase in Electronic Material Management leads to a significant improvement in supply chain performance of the firms in the enegy sector in Kenya.

These findings are consistent with that of Maggioni, Giliberti and Panunzio, (2021), the practices of electronic material management, enables the organisation to upgrade other aspects which can apply to products like scheduling production processes, fastening bill of material and maintaining level of inventory through Material Requirement Planning MRP and (MRP11). Manufacturing resource planning (MRPII) integrates manufacturing capacity with benefit of MRP.

The head of procurement assigned on warehouse is able to track products electronic through installing coding software, which will count any product available in warehouse by giving numbers and assist warehouse personnel on the unavailable products for purchases (Ancheta, 2017). It ensures goods are stocked to order, this reduces holding and ordering costs. There are some obstacles which hinder material management practices to be effective, these factors include; forgetting to order material, over pricing and under-pricing materials, late delivery of products, lack knowledge, lack of JIT strategy which is a useful approach to achieve success, lack of training, inadequate planning, lack of communication flow, poor relationship with supplier, management and shortage of finances (Yin & Ponnan, 2016).

5.2.3 Electronic Tendering and Supply Chain Performance

The third objective was to determine the influence of electronic tendering on supply chain performance of firms in the energy sector in Kenya. Descriptive findings indicated an agreement that E tendering process enables the company to improve transparency in supply chain performance, helps you to reduce costs associated with the traditional tendering process thus improves supply chain performance, increases the speed of the whole tendering process thus improves supply chain performance of the company and also helps to standardize then buying process throughout the supply chain management of the company.

Correlation findings indicated that Electronic Tendering was positively and significantly associated with supply chain performance of the firms in the energy sector implying that an increase in adoption of Electronic Tendering would lead to a significant improvement in supply chain performance of the firms in the energy sector. The regression findings indicated that Electronic Tendering has no significant association with supply chain performance of firms in the energy sector in Kenya.

The findings agree with that of Eshitoli, (2016) who stated that electronic tendering is an online practice used in procurement process, where all activities are conducted online from the first stage of advertisement to the last stage of issuing an award, this process tend to be transparent and accountable. Centralised process helps organisation to improve effectiveness, accountability and supply chain management performance. It also helps in reducing traditional tendering costs. Eshitoli, (2016) explains that electronic nature on E-tender market place states business shouldn't be left behind nor miss any opportunity since they have access to email, sms alerts on tenders publishedIf supplier have good relation with the Organisation, they related or worked with before, he will be able to reflect the tenders which have been posted on their portal without difficulties on operations.

According to Goh (2020) e-tendering process to be effective, it requires registration, submission and bid evaluation processes. This process need both buyers and bidder be registered online for them to be able to access web portal of E-tendering. Without proper registration of both party, it will be impossible to work online because the buyer will not be able to publish the tender and bidder will not be able bid the document. Bid evaluation is almost the final stage, where procurement creates an evaluation committee which analyses all the bid and prepare the report to support why certain tender has won (Eshitoli, (2016). Finally, they award contract to the supplier who won the tender.

5.2.4 Supply Chain Integration and Supply Chain Performance

The fourth objective was to establish the influence of supply chain integration on supply chain performance of firms in the energy sector in Kenya. Descriptive findings indicated that there is higher quality vendor pool with supply chain integration in the company supply chain performance, through supply chain integration transparency and visibility in the company supply performance, the companies are benefiting from increased

flexibility of having effective supply chain integration, supply chain integration ensures the company is sustainable in supplies and procurement functions and information delivered is accurate and that supply chain integration in the company in leads to increased collaboration with suppliers.

Correlation findings indicated that Supply Chain Integration was positively and significantly associated with supply chain performance of the firms in the energy sector implying that an increase in adoption of Supply Chain Integration would lead to a significant improvement in supply chain performance of the firms in the energy sector. Regression findings indicated that an increase in Supply Chain Integration leads to a significant improvement in supply chain performance of the firms in the enegy sector in Kenya.

The findings are consistent with that of a study by Khanuja and Jain (2019) who argued that Supply chain integration helps organisation to strengthens the relationship which exists among the parties working in the Organisation the most known is buyer-seller relationship. This variable enhances good understanding. Flow of communication is effective to ensure the activities have been conducted effectively to achieve the firm goals. Kang, in 2018 asserts that, Supply integration assists on improving an Organisational relationship and processes through global and real time collaboration on how to respond to changes in technology.

Information in public Organisation should be transmitted on official means like emails, fax and website which is legal and recognised for the purpose of recording and reference if need arises. Information sharing is where information is exchanged among parties involved across the Organisation in supply chain. Information should be timely, appropriate and available whenever it's required for use (Kang et. al, 2018).

5.3 Conclusions of the Study

The study concludes that EDI is associated with a significant improvement in supply chain performance of the firms in the energy sector. Specifically, it facilitates services faster to the company, customers and suppliers, minimizes errors in data entry and improves accounts working, ensures transparency in whole process of procurement procedures, improves supply chain performance and increase visibility.

The study also concludes that Electronic Material Management is associated with a significant improvement in supply chain performance of the firms in the energy sector. Specifically, it can enhance a firm's stock level, it can make great improvements on transportation and logistics in the company under supply chain performance, it can reduce capital expenses by ensuring there is no a lot of idle stock but goods supplied meets customer demands, it can eliminate duplicate handling of materials within the company's supply chain performance and also enable the company to facilitate the right type and quantity are acquired in the first place.

Another conclusion is that supply chain integration is associated with a significant improvement in supply chain performance of the firms in the energy sector. Supply chain integration leads to a higher quality vendor pool, through supply chain integration transparency and visibility in the company supply performance, the companies are benefiting from increased flexibility of having effective supply chain integration, supply chain integration ensures the company is sustainable in supplies and procurement functions and information delivered is accurate and that supply chain integration in the company in leads to increased collaboration with suppliers. The study further concluded that E tendering doesn't have a significant influence on supply chainperformance of the firms in the energy sector in Kenya.

5.4 Recommendationsfor Policy Implication

Based on the findings that EDI is associated with a significant improvement in supply chain performance of the firms in the energy sector facilitating faster services to the company, minimizing errors in data entry and improving accounts working, ensuring transparency in whole process of procurement procedures, the study recommends the firms in the energy secto as well as other firms to invest towards adoption of EDI in procurement.

Since it was established that Electronic Material Management is associated with a significant improvement in supply chain performance of the firms in the energy sector by enhancing a firm's stock level, making great improvements on transportation and logistics in the company under supply chain performance, reducing capital expenses by ensuring there is no a lot of idle stock but goods supplied meets customer demands, eliminating duplicate handling of materials within the company's supply chain performance and also enabling the company to facilitate the right type and quantity are acquired in the first place, the study recommends the firms in the energy secto as well as other firms to invest towards adoption of EMM in procurement.

It can also be recommended that since supply chain integration is associated with a significant improvement in supply chain performance of the firms in the energy sector by ensuring higher quality vendor pool, enhancing transparency and visibility in the company supply performance, increasing flexibility of having effective supply chain integration, ensuring the company is sustainable in supplies and procurement functions and delivering accurate information, the study recommends the firms in the energy secto as well as other firms to invest towards adoption of supply chain integration in procurement.

5.5 Limitations of the Study

The study was limited to the firms in the energy sector in Kenya only. Even though firms in the energy sector are many, the findings of this study may not be generalised to other firms which do not have a strong SCM system compared to those listed which formed a case study for this study. The researcher experienced challenges during data collection period given that it was COVID-19 period where physical contact was highly discouraged. However, safety measures were considered.

5.6 Areas for further Study

The study was delimited to listed firms in the energy sector only since compared to other firms, these four have advanced supply chain management systems. However, this opens up an avenue for future interrogation on a wider scope by inclusion of other firms in the same industry. The other studies can interrogate whether e-procurement adoption by other firms in that sector can significantly influence their supply chain performance.

The energy sector in kenya faces a lot of challenges which may range from stiff competition, political instability, changes in global oil prices which leads to disruption in the supply chain. This study did not control for such environments and thus, there is a need for future studies to consider moderating these conditions in order to establish the true picture of the link between e-procurement and supply chain performance.

Lastly, it is common sense that e-procurement is not the only determining factor of supply chain performance in the energy sector. As a result, other studies can seek to find out what other factors affect supply chain performance in this sector given that the four interrogated, account for up to 62.1 percent of the variation in supply chain performance of the firms in the energy sector in Kenya.

REFERENCES

Aduwo, E. B., Ibem, E. O., Uwakonye, O., Tunji-Olayeni, P. F., & Ayo-Vaughan, K. (2016). Barriers to the uptake of e-Procurement in the Nigerian building industry. *Journal of Theoretical and Applied Information Technology*, *89*(1), 133-147.

Agag, G., & El-Masry, A. A. (2016). Understanding consumer intention to participate in online travel community and effects on consumer intention to purchase travel online and WOM: An integration of innovation diffusion theory and TAM with trust. *Computers in human behavior*, *60*, 97-111.

Albinkalil, A. M. (2021, March). Effects of E-procurement on supply chain. In *European, Asian, Middle Eastern, North African Conference on Management & Information Systems* (pp. 133-143). Springer, Cham.

Al-Nabhani, A. (2017). E-procurement: improving efficiency in the procurement process. *International Journal of Logistics Management*, 18(1), 92-105.

Al-Rahmi, W. M., Yahaya, N., Aldraiweesh, A. A., Alamri, M. M., Aljarboa, N. A., Alturki, U., & Aljeraiwi, A. A. (2019). Integrating technology acceptance model with innovation diffusion theory: An empirical investigation on students' intention to use E-learning systems. *Ieee Access*, *7*, 26797-26809.

Ancheta, A. (2017). Electronic Waste Management Practices and Its Extent of Implementation: A Case of an Academic Institution. *Journal of Educational and Human Resource Development (JEHRD)*, *5*, 51-57.

Baden-Fuller, C., & Teece, D. J. (2020). Market sensing, dynamic capability, and competitive dynamics. *Industrial Marketing Management*, *89*, 105-106.

Benito, G. R., Petersen, B., & Welch, L. S. (2019). The global value chain and internalization theory. *Journal of International Business Studies*, *50*(8), 1414-1423.

Berndt, A. E. (2020). Sampling methods. *Journal of Human Lactation*, *36*(2), 224-226.

Biswal, P., Adhikari, M., & Misra, S. (2017). Risk management in supply chain using e-procurement. *International Journal of Applied Engineering Research*, 12(8), 1538-1546.

Chen, Y., Bretschneider, S., Stritch, J. M., Darnall, N., & Hsueh, L. (2021). E-procurement system adoption in local governments: the role of procurement complexity and organizational structure. *Public Management Review*, 1-23.

Choi, H., Park, M. J., Rho, J. J., & Zo, H. (2016). Rethinking the assessment of e-government implementation in developing countries from the perspective of the design–reality gap: Applications in the Indonesian e-procurement system. *Telecommunications Policy*, *40*(7), 644-660.

Cruz, A. M., & Haugan, G. L. (2019). Determinants of maintenance performance: A resource-based view and agency theory approach. *Journal of Engineering and Technology Management*, *51*, 33-47.

Das, A., Kumar, S., & Sahoo, S. (2018). E-procurement: Digitizing the procurement of goods and services. *Procedia Manufacturing*, 21, 515-521.

Davis, G. F., & DeWitt, T. (2021). Organization theory: A great divide. *Journal on Management*, *47*(7), 1684-1697.

Denrell, J., & Powell, T. C. (2016). Dynamic capability as a theory of competitive advantage. In *The Oxford Handbook of Dynamic Capabilities*.

Eshitoli, W. J. (2016). *E-Tendering Adoption and Procurement Performance of Oil Marketing Firms in Kenya* (Doctoral dissertation, University of Nairobi).

Faheem, M., & Siddiqui, D. A. (2019). The impacts of Electronic procurement performance in supply chain: a Case on B2B Procurement (Pakistani Industry). *Available at SSRN 3510616*.

Flynn, B. B., Koufteros, X., & Lu, G. (2016). On theory in supply chain uncertainty and its implications for supply chain integration. *Journal of Supply Chain Management*, *52*(3), 3-27.

Gascó, M., Cucciniello, M., Nasi, G., & Yuan, Q. (2018). Determinants and barriers of e-procurement: A European comparison of public sector experiences.

Goh, P. L. (2020). *E-Tendering Systems Application in Malaysian Construction Industry: Benefits and Challenges* (Doctoral dissertation, Tunku Abdul Rahman University College).

Gupta, S., Qian, X., Bhushan, B., & Luo, Z. (2019). Role of cloud ERP and big data on firm performance: a dynamic capability view theory perspective. *Management Decision*.

Hainzer, K., Best, T., & Brown, P. H. (2019). Local value chain interventions: a systematic review. *Journal of Agribusiness in Developing and Emerging Economies*.

Ho, J. C. (2021). Disruptive innovation from the perspective of innovation diffusion theory. *Technology Analysis & Strategic Management*, 1-14.

Huemer, C., Liegl, P., & Zapletal, M. (2020). Electronic data interchange and standardization. *Handbook of e-Tourism*, 1-29.

Hussein, W. M., & Musau, E. G. (2020). Adoption of Supply Chain Drivers on Sustainable Performance of Constituency Development Funded Projects in Bungoma County. Supply chain international journal, *5*(2), 1-16.

Ibem, E. O., Aduwo, E. B., Tunji-Olayeni, P., Ayo-Vaughan, E. A., & Uwakonye, U. O. (2016). Factors influencing e-Procurement adoption in the Nigerian building industry. *Construction Economics and Building*, *16*(4), 54-67.

Iles, J. (2017). How e-procurement is related to the success of US cities' sustainable purchasing policies?

Jermsittiparsert, K., Namdej, P., & Somjai, S. (2019). Green supply chain practices and sustainable performance: moderating role of total quality management practices in electronic industry of Thailand. *International Journal of Supply Chain Management*, *8*(3), 33-46.

Jermsittiparsert, K., Namdej, P., & Sriyakul, T. (2019). Impact of quality management techniques and system effectiveness in green supply practices. *International Journal of supply management*, *8*(3), 120-130.

Kahoreria, W. R., Bett, S., & Wanjala, K. (2019). Power Connectivity and Performance of Kenya Power and Lighting Company in Western Kenya. *The International Journal of Science & Technoledge*, *7*(10). https://doi.org/10.24940/theijst/2019/v7/i10/st1910-026

Kang, M., Yang, M. G. M., Park, Y., & Huo, B. (2018). Supply chain integration and its impact on sustainability. *Industrial Management & Data Systems*.

Kannan, D., & Kannan, D. (2013). Impact of E-Procurement on Supply Chain Management. *International Journal of Business and Management*, 8(11), 15-27.

Kazdin, A. E. (2021). *Research design in clinical psychology*. Cambridge University Press.

Khanuja, A., & Jain, R. K. (2019). Supply chain integration: a review of enablers, dimensions and performance. *Benchmarking: An international journal*.

Klapita, V. (2021). Implementation of Electronic Data Interchange as a Method of Communication Between Customers and Transport Company. *Transportation Research Procedia*, *53*, 174-179.

Kumar, N. (2016). The role of e-procurement in supply chain management: A systematic literature review. *International Journal of Supply Chain Management*, 5(4), 299-312.

Lee, H., & Billington, C. (2014). The role of e-procurement in supply chain management. *Communications of the ACM*, 47(2), 38-43.

Lewis-Faupel, S., Neggers, Y., Olken, B. A., & Pande, R. (2016). Can electronic procurement improve infrastructure provision? Evidence from public works in India and Indonesia. American Economic Journal: Economic Policy, 8(3), 258-83.

Mafini, C., Dhurup, M., & Madzimure, J. (2020). E-procurement, supplier integration and supply chain performance in small and medium enterprises in South Africa. *South African Journal of Business Management*, *51*(1), 1-12.

Maggioni, B., Giliberti, F., & Panunzio, E. (2021, September). Integrating Sustainability into Material Management Practices. In *SPE Annual Technical Conference and Exhibition*. OnePetro.

Marak, Z. R., Tiwari, A., & Tiwari, S. (2019). Adoption of 3D printing technology: an innovation diffusion theory perspective. *International Journal of Innovation*, *7*(1), 87-103.

Masudin, I., & Kamara, M. S. (2017). Electronic Data Interchange and Demand Forecasting Implications on Supply Chain Management Collaboration: A Customer Service Perspective. *Jurnal Teknik Industri*, *18*(2), 138-148.

Masudin, I., Aprilia, G. D., Nugraha, A., & Restuputri, D. P. (2021). Impact of E-procurement adoption on company performance: Evidence from Indonesian manufacturing industry. *Logistics*, *5*(1), 16.

Matano, F., Musau, E., & Nyaboga, Y. B. (2020). Effects of e-procurement implementation practices on procurement of goods, works and services in the national youth service, Nairobi City County. *Int Acad J Procure Supply Chain Manage*, *3*(2), 63-82.

Mathur, B., Gupta, S., Meena, M. L., & Dangayach, G. S. (2018). Healthcare issues on supply chain management *Research journal on advanced management*.

Mellahi, K., Frynas, J. G., Sun, P., & Siegel, D. (2016). A review of the nonmarket strategy literature: Toward a multi-theoretical integration. *Journal of management*, *42*(1), 143-173.

Mesquita, M., & Frazao, P. (2019). E-procurement for improving the supply chain performance: A systematic review. *International Journal of Production Economics*, 208, 441-454.

Munir, M., Jajja, M. S. S., Chatha, K. A., & Farooq, S. (2020). Supply chain risk management and operational performance: The enabling role of supply chain integration. *International Journal of Production Economics*, *227*, 107667.

Musyoki, C. M. (2019). Electronic Tendering Adoption and Procurement Performance of Public Institutions: a case of National Housing Corporation.

Mutangili, S. K. (2019). Influences of E-procurement activities: A Case Study on Kenya Airways. *Journal of Procurement & Supply Chain*, *3*(2), 1-16.

Mwangi, E. W., & Kagiri, A. (2016). Effects of e-procurement at hospitality industry on Kenya: a case study in Sarova chain of hotels. Academic international journal, 2(2), 1-19.

Mweru, M. C., & Maina, T. M. (2016). Features of resource based view theory: An effective strategy in outsourcing.

Nani, D. A., & Ali, S. (2020). Determinants of Effective E-Procurement System: Empirical Evidence from Indonesian Local Governments. *Jurnal Dinamika Akuntansi Dan Bisnis*, *7*(1), 33-50.

Njeru, G., Gathiaka, J., & Kimuyu, P. (2021). Explaining Kenya Electricity Tariffs. Economic management , business journal ,*8*(2), 119-133.

Oteki, E. B. (2019).influence of E procurement on organisation performance in sugar firms in Kenya (Doctoral dissertation, JKUAT-COHRED).

Oteki, E. B., Namusonge, G. S., Sakwa, M., & Ngeno, J. (2018). Impacts of Electronic ordering processes on sugar industries in Kenya toward performance in supply chain.

Rajab, N. F. (2018). Effect of Regulated Electronic Tendering in implementation of Kenya regulations in state corporations. Journal on *Supply Chain Management Systems*, *7*(1).

Rajak, S., Parthiban, P., & Dhanalakshmi, R. (2021). A DEA model for evaluation of efficiency and effectiveness of sustainable transportation systems: in supply perspective. *International Journal of Logistics management international journal 40*(2), 220-241.

Rich-Edwards, J. W., Kaiser, U. B., Chen, G. L., Manson, J. E., & Goldstein, J. M. (2018). Sex and gender differences research design for basic, clinical, and population studies: essentials for investigators. *Endocrine reviews*, *39*(4), 424-439.

Sainsbury, D. (2020). Toward a dynamic capability theory of economic growth. *Industrial and Corporate Change*, *29*(4), 1047-1065.

Saleh, S. Y. (2018). *Determining critical factors of e-procurement adoption among suppliers in Iraq* (Doctoral dissertation, Universiti Utara Malaysia).

Sánchez-Rodríguez, C., Martínez-Lorente, A. R., & Hemsworth, D. (2019). E-procurement in small and medium sized enterprises; facilitators, obstacles and effect on performance. *Benchmarking: An International Journal*.

Sanil, H. S., Ramakrishnan, S., Alwethainani, M., Kazi, A. G., & Siddique, M. (2016). Effectiveness of supply chain management with reference to apparel industry: A case study in India. *International Review of Management and Marketing*, *6*(4S), 176-184.

Schoonenboom, J., & Johnson, R. B. (2017). How to construct a mixed methods research design. *KZfSS Kölner Zeitschrift für Soziologie und Sozialpsychologie*, *69*(2), 107-131.

Seth, M., Goyal, D. P., & Kiran, R. (2017). Diminution of impediments in implementation of supply chain management information system for enhancing its effectiveness in Indian automobile industry. *Journal of Global Information Management (JGIM)*, *25*(3), 1-20

Sharma, G. (2017). Pros and cons of different sampling techniques. *International journal of applied research*, *3*(7), 749-752.

Sousa, R., & Fleming, D. (2018). The influence of e-procurement on supply chain management. *International Journal of Physical Distribution & Logistics Management*, 38(1), 5-20.

Sunmola, F. T., & Shehu, Y. U. (2020). A Case Study on Performance Features of Electronic Tendering Systems. *Procedia Manufacturing*, *51*, 1586-1591.

Tran, Q., Steve, D., & Stewart, R. A. (2021). Effects of Supply Chain Characteristics on E-Procurement Institutionalization in the Construction Sector: Evidence From Developing Countries. *International Journal of Enterprise Information Systems (IJEIS)*, *17*(3), 85-96.

Truong, D. (2019). Distrust issues in business-to-business e-procurement decisions. *Journal of Enterprise Information Management*.

Tutu, S. O., Kissi, E., Osei-Tutu, E., & Desmond, A. (2019). Evaluating critical factors for the implementation of e-procurement in Ghana. *International Journal of Procurement Management*, *12*(1), 1-14.

Waithaka, R. K., & Kimani, J. G. (2021). Effect on Electronic procurement on supply performance *Global Journal on Purchasing And Procurement Management*, *1*(1), 32-42.

Wang, G. W., Zeng, Q., Qu, C., & Mileski, J. (2018). A game theory application of a cruise value chain–the case of China. *Maritime Business Review*.

Wright, S., O'Brien, B. C., Nimmon, L., Law, M., & Mylopoulos, M. (2016). Research design considerations. *Journal of graduate medical education*, *8*(1), 97-98.

Yala, H. O. (2018). Impact of customer satisfaction of durability of materials used in electric power distribution at Kenya power and lighting company (KPLC), Kenya (2010-2012). *International Journal of Advanced Educational Research*, *3*(2), 371-377.

Yin, J. S. K., & Ponnan, R. (2016). Challenges and Innovations in Management Practices of Censorable Film Content in The Electronic Media Industry. *Journal of Engineering Sciences and Technology Special Issue on SU18*, *2*(19), 68-77.

Yunitarini, R., & Santoso, P. B. (2018). A literature review of electronic data interchange as electronic business communication for manufacturing. *Management and Production Engineering Review*, *9*.

Zhang, B., Bai, S., Ning, Y., Ding, T., & Zhang, Y. (2020). Emission embodied in international trade and its responsibility from the perspective of global value chain: progress, trends, and challenges. *Sustainability*, *12*(8), 3097.

APPENDICES

APPENDIX 1: Introduction Letter

Dear Madam/Sir,

REF: <u>Data Collection Permission</u>

I am a KCA student pursuing a Masters course in Business Administration Procurement and Supplies option. Nairobi campus, am requesting permission to carry out data collection in your organisation. As a requirement to complete my course, am carrying research on procurement department. My research topic is "Influence of Electronic procurement on practices of supply chain in Kenya power as an Energy Company.

I am humbly requesting your organisation to respond my questionnaire positively, since provided information will be for study only and will be kept confidential. The questionnaire will not allow the respondent to indicate their names and age due to privacy and victimization which may occur thereafter. Am glad to carry research in your Organisation which serves the country with Power. The final document may be provided to the company upon their request.

Looking forward to work effectively and positively with the company.

Thanks in Advance.

Esther Ng'ang'a Sign…… Supervisor Sign ……..

ADM: 21/01647 Dr Jackson Ndolo

Appendix II: Questionnaire

SECTION A: General information

What level of education have you attained?

Primary [ ] Secondary [ ] Diploma [] University [ ]

Other

(Specify)……

……

Experience duration in department?

a. [ ] below 5 years

b. [ ] 6- 9years

c. [ ] over 10 years

SECTION B

1. **PART A: Electronic Data Interchange and Supply Chain Performance**

Kindly select by ticking the level in which electronic data Interchange affects performance in Organization.

Using below grids tick your answer correctly

Main: 1= Disagree strongly 2= disagree 3= unsure 4=agree 5= Agree strongly

Variable star	**Question**	**Outcome**				
		DS	**D**	**U**	**A**	**AS**
	Specified question	**1**	**2**	**3**	**4**	**5**
Electronic Data Interchange	EDI facilitates services faster to the company, customers and suppliers					
	EDI minimizes errors in data entry and improves accounts working in Kenya power company.					
	EDI ensure transparency in whole process					

	of procurement procedures.					
	EDI improves supply chain performance and increase visibility in Kenya power.					
	EDI authenticate data's and ensures errors reflected are rectified immediately					

2. **PART B: Electronic Material Management Practices and Supply Chain Management**

Kindly choose by ticking 1-5 the level to which electronic material management practices affects organizational performance.

Use the following grid to answer the questions.

Main: 1= Disagree strongly 2= disagree 3= unsure 4=agree 5= Agree strongly

Variable quantity	**Matters**	**Scale of agreement**				
		DD	**D**	**U**	**A**	**AS**
	Statement	**1**	**2**	**3**	**4**	**5**
Electronic Material Management Practices	The firm's stock level are enhanced through the use of electronic Material Management practices.					
	EMM can make great improvements on transportation and logistics in the company under supply chain performance					
	With EMM, the company can be able to reduce capital expenses by ensuring there is no a lot of idle stock but goods supplied meets customer demands					
	Electronic material management practices eliminate duplicate handling of materials within the company's supply chain performance					
	Electronic material management practices enable the company to facilitate the right type and quantity are acquired in the first place.					

3. PART C; Electronic Tendering and Supply Chain Performance

Kindly tick the level in which electronic tendering affects Kenya power performances as indicated in table,

Main: 1= Disagree strongly 2= disagree 3= unsure 4=agree 5= Agree strongly

Variables	**Matters**	**Scale of agreement**				
		DS	**D**	**U**	**A**	**AS**
	Statement question	**1**	**2**	**3**	**4**	**5**
Electronic Tendering	E tendering process enables the company to improve transparency in supply chain performance					
	E tendering helps you to reduce costs associated with the traditional tendering process thus improves supply chain performance					
	E tenders increase the speed of the whole tendering process thus improves supply chain performance of the company					
	Adopting e Tendering helps to standardize then buying process throughout the supply chain management of the company					
	There is less scope of manual errors during the e-tendering process in supply chain management of the company					

4. PART D: Supply Performance Under Supply Chain Integration

Kindly tick level in which supply chain integration influences Organization Performance.

Use grid below to answer the questions.

Key: 1=strongly disagree 2= disagree 3= undecided 4=agree 5= strongly agree

Variables	**matter**	**Agreement scales**				
		SD	**D**	**U**	**A**	**SA**
	Question	**1**	**2**	**3**	**4**	**5**
Supply Chain	There is higher quality vendor pool					

Integration	withsupply chain integration in the company supply chain performance					
	Through supply chain integration transparency and visibility in the company supply performance					
	KPLC is benefiting from increased flexibility of having effective supply chain integration.					
	Supply chain integration ensures Kenya power is sustainable in supplies and procurement functions and information delivered is accurate.					
	Supply chain integration in the company in leads to increased collaboration with suppliers.					

5. PART E: Effectiveness of supply chain management

Kindly tick which factors measures the performance improvement in firm after Implementing effective supply chain performance

Use the following grid to answer the questions.

Key: 5=above 20% 4=between 13% & 20% 3=between 5% & 12%

2=between 1% & 4% 1=Not at all

Variable	**Items**	**Agreement scales**				
	Statement description	**1**	**2**	**3**	**4**	**5**
Effectiveness on supply management	Effectiveness					
	Customer satisfaction					
	Cost minimization					
	Quality Product					
	Short Leadtime					