EFFECT OF ELECTRONIC LOGISTICS PRACTICES ON SUPPLY CHAIN PERFORMANCE OF LOGISTIC COMPANIES IN NAIROBI, KENYA.

BY

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A RESEARCH THESIS SUBMITTED TO THE SCHOOL OF BUSINESS AND ECONOMICS, MANAGEMENT DEPARTMENT OF MARKETING AND LOGISTICS IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN LOGISTIC AND SUPPLIES

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DECLARATION

Declaration by the Candidate

This research thesis is my own work and has not been presented for a degree award in any other university. No part of this thesis should be produced without prior written permission of the author and/or Moi University.

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DEDICATION

I dedicate this research thesis to my parents and my son Evashia Kiprotich for financial and moral support.

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ABSTRACT

In every ideal situation supply chain performance objective is to increase productivity, lower costs and fulfill the demands of the customers in emerging markets. Therefore, effective management of the supply chain can lead to organizations to gain market share, reduce costs, and deliver more value to their shareholders. The main aim of this study was to assess the effect of electronic logistics on supply chain performance of logistic companies in Nairobi, Kenya. The study specific objectives were: To examine the effect of: E- tendering on supply chain performance of logistic companies, automated warehousing operations systems on supply chain performance of logistic companies, electronic order processing on supply chain performance of logistic companies and to determine the effect of enterprise resource planning on supply chain performance of logistic companies in Nairobi. The study used the innovation diffusion theory, technological determinism theory, queuing theory and resources-based view theory. The study adopted explanatory research design and simple random sampling techniques in collecting data using a structured questionnaire from a sample size of 323 picked from a target population of 1672 logistic companies in Nairobi County. Cronbach Alpha and factor analysis were used to test for reliability and validity of the instrument. Multiple regression model was used to test for the hypotheses. The study findings revealed that E- tendering (β_1=0.333, $p<0.05$), automated warehousing operations systems (β_2=0.112, $p<0.05$), Electronic order process (β_3=0.308, $p<0.05$) and enterprise resource planning (β_4=0.191, $p<0.05$) were all found to have a positive and significant influence on supply chain performance. The study concludes that E- tendering can enable logistic companies to reduce the time for tender processing. Automation of storage information, retrieval of warehouse information and automation in warehousing can enhance accuracy and efficiency of logistic companies. Electronic order can enhance capturing and administering data electronically which reduces paperwork and time wastage and makes tracking of shipping goods and products easily thus giving clients confident on logistic companies. Dissemination of logistic information to customers through electronic order enhances the performance of logistic companies. The study recommends that organizational managers should focus directly on supply chain functions such as logistics to bolster the competitiveness of the supply chains in which their organizations are integral partners. The study also recommends that the companies should use a strategic approach to logistics management practices through embracing modern technology and employee training. The study finally recommends that adoption of electronic order process. This will reduce operational costs, improves process efficiency, delivers greater centralized control over purchasing and may increase negotiating power with suppliers through order consolidation.

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DEFINITION OF TERMS

Automation in warehousing operations is one of the last areas where long-term costs can be significantly reduced (Hamberg & Verriet, 2012).

Electronic order processing is the process of ordering products or services through electronic means to ensure order fulfilment and the first stage of the fulfilment cycle (Riordan, Storkenmaier, Wagener & Zhang, 2013).

Electronic–logistics is the logistical process that governs everything related to the online marketplace (Samah, Siti & Gopal, 2015).

Enterprise resource planning is a system of integrated software applications that standardizes, streamlines and integrates business processes across finance, human resources, procurement, distribution, and other departments (Costa *et al.*, 2016).

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

Logistics is that part of the supply chain process that plans implements, and controls the efficient, effective flow and storage of goods, services, and related information from the point-of-origin to the point-of-consumption in order to meet customers requirement (Kozlenkova *et al*., 2015).

Supply chain performance is the entire chain's ability to meet end-customer needs through product availability and responsiveness on-time delivery (Birhanu, Lanka & Rao, 2016).

ABBREVIATIONS

ANOVA	Analysis of Variance
ASN	Advanced shipping notice
EDI	Electronic Data Interchange
EMS	Expedited Mail Service
EOP	Educational Opportunity Program
E-SCM	E-Supply chain performance Systems
GDP	Gross Domestic Product
IOC	inter-Organizational Collaboration
IT	Information Technology
KPIs	Key Performance Indicators
LIS	Logistics Information Systems
PMS	Performance Measurement Systems
POP	Point of Purchase
POS	Point of Sale
SCM	Supply chain performance
WMS	Warehouse Management System

CHAPTER ONE

INTRODUCTION

1.0 Overview

This chapter examines the background of the study, statement of the problem, objectives of the study, hypotheses of the study, significance and the scope of the study.

1.1 Background of the Study

Supply chain performance has been of great concern to many logistic companies due to the complex environment in which companies compete. Markets have become far more dynamic and turbulent with rapid changes in customer requirements (Christopher, 2016). The markets have also become more segmented which means that customers have various requirements for products and services. In addition, increased requirements on companies from a market to deliver multiple product varieties and provide customized solutions of both products and services are increasing. Furthermore, global competition has put pressure on companies to become faster, better, and cheaper (Mangan, Lalwani & Lalwani, 2016).

Measuring supply chain performance might lead to a greater understanding of the supply chain and helps to test and reveal the viability of a firm's strategies. In addition, Mital, Giudice and Papa (2018) stated that measuring supply chain performance provides important feedback information, helps to reveal progress, increase employers' motivation and communication, and helps to diagnose problems. The measures that help a company measure their progress on performance objectives in everyday work are often referred to as key performance indicators (KPIs).

Therefore, overall performance of the supply chain significantly affects the financial health of all companies (Christopher, 2016). Therefore, an effective supply chain performance measurement process should be able to directly address performance areas that create sustainable profitability and financial strength. In order to accomplish this requirement, the performance measurement process will need to provide a reliable indication of the contribution of supply chain operations to the areas like growth, cost minimization, working capital efficiency and fixed asset utilization (Christopher, 2016).

Electronic logistics are used by many global companies as a strategic way to reduce time to market, decrease costs, improve quality, and improve overall customer satisfaction (Streetman, & Banerjee, 2016). Before the 1980's, Electronic logistics were primarily utilized to reduce labour costs and to provide additional manufacturing capabilities. Electronic logistics customers provided all board designs, components and testing. In the 1980's, because of the rapid increase in electronic manufacturing, Electronic logistics providers stretched their services to not only provide consignment but complete turnkey services such as product design, materials management, final assembly, and in some cases, after-sale services (Lloyd-Walker & Walker, 2015).

Close to 60% of all products produced by Electronic logistics providers are for the computer or consumer products industries. Other industries utilizing Electronic logistics include automotive, communications, medical and office equipment. With the reality that most companies want to reduce labour costs, many turns to outsourcing through EMS to gain advantage. Outsourcing is a management strategy that farms out non-core organizational activities to vendors who specialize in these activities in order to execute them more efficiently (Valverde & Saade, 2015).

The changing environment of the business market, with its focus on costs, quality, flexibility and technology to meet the competitive challenges is causing major changes in inter-organizational business relationships and many manufacturers are developing closer relationships with their suppliers the application of E-Supply chain performance Systems (e-SCM) (Agan, Kuzey, Acar, & Açıkgoz, 2016). This business-to-business approach not only provides the lenience of exchange in information, but also allows industries such as EMS to increase the accuracy and efficiency of business transactions processing (Valverde & Saade, 2015). African companies have employed integrated and seamless logistics in their supply chain processes. However, greater integration increases the dependency between companies, and exposes them to the risks of other companies (Kauppi, Longoni, Caniato & Kuula, 2016). Indeed, increasing risks are a current trend in logistics, and supply chains are more vulnerable than ever before (Urciuoli & Hintsa, 2018).

In Kenya most logistic companies are faced with supply chain challenges and yet they do not have a structured management and mitigation system covering logistic performance. It is therefore no surprise that risks are considered the main reason why desired performance is not achieved in most Kenyan organizations (Leach *et al*., 2016). Supply chains have grown more nationally and interconnected; as a result, they have increased their exposure to shocks and increased the frequency of disruptions. Supply chain speed only exacerbates the problem. Even minor missteps and miscalculations can have major consequences as their impacts spread like virused throughout complex supply chain networks, (Poirier, 2016). As compliance mandates, suppliers and information flows multiply, supply chains are becoming more complex, costly and vulnerable.

Organizations in Kenya are finding it increasingly difficult to respond to these challenges, especially with conventional supply chain strategies and designs. Supply chain performance is an important element in order to stay competitive (Yawar and Seuring, 2017). As firms increasingly emphasize cooperative relationships with critical suppliers, executives of buyer firms are using supplier evaluations to ensure that their performance objectives are met (Prahinski & Benton, 2014). The applications of electronic-logistics onto supply chain have many different configurations. Lee *et al*. (2012) noted that electronic-logistics assist the supply chain partners inside the network system to quickly confirm or feedback via internet to fulfill customer's requirement.

Currently, complicated supply chain systems especially the systems which are based on electronic supply chain performance pave the way for the big companies for payment management. Electronic logistics is the most important technology which provides the area for e-payment in supply chain performance (Kaboutari, 2013). Despite influence of electronic supply in supply chain system at small and big businesses throughout the world and importance of this technology as a logic for payment within supply chain, it can witness that various businesses especially start-up businesses in current community adjust themselves with this technology with a negligible speed and insist on use of their own traditional method. One of the most important reasons for this negative habit can be lack of practitioners' information on effect of these technologies on performance of their supply chain or lack of risk in acceptance and use of these technologies at their businesses. Therefore, there is a research gap to explore on effect of Electronic logistics on supply chain performance of logistic companies in Nairobi, Kenya.

1.2 Statement of the Problem

Ideally supply chain performance aims at increasing productivity, lowering costs and fulfilling the demands customers in emerging markets. Effective supply chain performance helps in leading corporations gain market share, reduce costs and deliver more value to their shareholders. Increased competitiveness in all industrial sectors, sharpened by globalization and the fall of global supply, is forcing companies towards the optimization of their business processes and new ways of mergers or partnerships with direct results in decreased business costs (Xiao, 2017). With these strategic alliances, new management strategies are formed as E-logistics. Jhawar, Garg and Kheraj (2017) make references that logistics are worth 10% to 12% of the GDP on any country. According to Rogoff (2015), Electronic logistics have a potential of lowering costs by 10%. On the basis of these two references, we can conclude that Electronic logistics can save our money for as much as 1.2% of the GDP.

Despite logistics companies in Kenya installing software to improve cargo transportation in a bid to increase efficiency and cut costs, Kenya's logistics sector was ranked as one of the two most inefficient in the region (East Africa Logistics Performance Survey, 2018). In the survey Kenya posted a score of 2.59 points compared to the 2.82 and 2.60 points realized by Uganda and Tanzania respectively. The country performed poorly on timely delivery of shipments, the competence and quality of logistics services, the percentage of shipments physically inspected the transparency in conducting customs valuations and on conflict management in trade disputes. High transport costs coupled with delays along key highway corridors and the port of Mombasa continue to weigh down Kenya's global trade profile with a latest survey by the World Bank (2018) ranking the country the worst among its EAC partners in terms of logistics performance.

Such performance is considered a drawback to trade flow because importers and exporters incur extra costs as a result of the need to mitigate the effects of unreliable supply chains. This problem of logistic companies in transportations has hit industries and companies because of the lengthy nature of their supply chain where they have to source for raw material and export finished products to far flung markets. Several previous studies regarding electronic logistic and supply chain performance have concentrated on developed countries which have fully embraced e –logistic in logistic therefore the concept is still an emerging issue in majority of African countries (Njoora & Noor, 2017; Obicci, 2017). Therefore, there is a need to fill in the existing gap in literature by assessing the effect of electronic – logistics practices on supply chain performance of Logistic Companies in Kenya.

1.3 Objectives of the Study

This study was guided by both general and specific objectives;

1.3.1 General Objective

The main aim of this study was to assess the effect of electronic – logistics practices on supply chain performance of logistic companies in Nairobi, Kenya.

1.3.2 Specific objective

i. To examine the effect of E- tendering on supply chain performance of logistic companies in Nairobi.
ii. To investigate the effect of automated warehousing operations systems on supply chain performance of logistic companies in Nairobi.
iii. To establish the effect of electronic order processing on supply chain performance of logistic companies in Nairobi.

iv. To determine the effect of Enterprise resource planning on supply chain performance of logistic companies in Nairobi.

1.4 Research Hypotheses

H_{01}: E- tendering has no significant effect on supply chain performance of logistic companies in Nairobi.

H_{02}: Automated warehousing operations systems have no significant effect on supply chain performance of logistic companies in Nairobi.

H_{03}: Electronic order processing has no significant effect on supply chain performance of logistic companies in Nairobi.

H04: Enterprise resource planning on supply chain performance of logistic companies in Nairobi.

1.5 Significance of the Study

The research findings will be of significance in enhancing the effectiveness and efficiency of the logistic department by giving eminence to the need for embracing e-logistic. It will help logistic companies to appreciate the essence of promoting the use of e-logistic in the whole process of logistic and supply chain performance for purposes of enhancing its performance. The study will also be useful to the government and its policy-making agencies as it will guide policy makers on the need to strengthen the adoption of e-logistics in public institutions. The logistics managers and organizational leaders will gain knowledge and a better understanding of the importance of implementing e-logistics. Future researchers will also benefit from this study as it will provide literature for those who will wish to research on relate area.

1.6 Scope of the Study

The study established the effect of electronic –logistics practices on supply chain performance of logistic companies in Nairobi, Kenya. The study variables were E-tendering, automated warehousing operations systems, electronic order processing and enterprise resource planning as independent variables while and dependent variable was supply chain performance. The study adopted explanatory survey research design. Data were collected from operational managers who are believed as major respondents in the study. The study was done from logistic companies in Nairobi County, Kenya, as from the beginning of July 2019 to March 2020. The research used simple random sampling to select the respondents. This was done to get a fair representation of the logistic companies in Nairobi County.

CHAPTER TWO

LITERATURE REVIEW

2.0 Overview

This chapter reviewed the literature related to supply chain performance, E- tendering, automated warehousing operations systems, electronic order processing and enterprise resource planning on supply chain performance. The chapter reviewed related theories, summary of reviewed literature and conceptual framework.

2.1 Concept of Supply Chain Performance

Supply chain performance is the entire chain's ability to meet end-customer needs through product availability and responsiveness on-time delivery (Birhanu, Lanka & Rao, 2016). Supply chain performance involves both functional lines and company boundaries. Improving supply chain performance is a continuous process that requires both an analytical performance measurement system, and a mechanism to initiate steps for realizing key performance indicators (KPI) goals. To measure supply chain performance, there are a set of variables that capture the impact of actual working of supply chains on revenues and costs of the whole system (Wang & Cullinane, 2015).

These variables as drivers of supply chain performance are always derived from supply chain performance practices (Anand & Grover, 2015). Supply Chain Performance can be measured in the context of the following supply chain activities/processes: plan, source, make/assemble, and delivery/customer. These activities are considered at various levels of management strategic, tactical, and operational levels (Strahwald & Sucky, 2017). The benefits of supply chain performance measurement systems are outweighed by the cost of implementing and maintaining them (Razak, Rowling, White & Mason-Jones, 2016).

This is likely to be especially applicable for logistic companies which may lack the resources, time or information to undertake the analyses required to optimize supply chain activities (Katiyar *et al*., 2018). There are various determinants of supply chain performance that contributes to efficient and effective performance of supply chain in the organization namely ICT, knowledge and information sharing, trust, culture and joint decision making (Tanque & Foxwell, 2018). Regular measurements of a system's services and programs are important from a manager's perspective especially in the banking systems (Avgerou & Walsham, 2017).

This is because he or she is looking to measure progress towards managing for results; which is a customer-oriented progress that focused on maximizing benefits, and minimizing the negative consequences of service programs. Performance measures are recognized as important tools of all Total Quality Management programs. Managers and supervisors directing the efforts of an organization or a group have a responsibility to know how, when, and where to institute a wide range of changes (Mone & London, 2018). These changes cannot be sensibly implemented without knowledge of the appropriate information upon which they are based (Magenda, 2014).

Supply chain integration includes the internal linkages among the departments, functions, or business units within the firm that source, make, and deliver products and the external linkages with entities outside the enterprise including the network of direct suppliers and their suppliers and direct customers and their customers this significantly contributes to supply chain performance (Monczka *et al*., 2015). Information sharing does not only share information with partners, but also provides adequate, timely and accurate information (Wu, Chuang & Hsu, 2014). In other words, information sharing should include the concept of information quality.

Information quality includes such aspects as the accuracy, timeliness, adequacy, and credibility of information exchanged. The senior procurement managers are influential people in procurement processes since their joint planning decisions affect whole supply chain network (Demirkesen & Ozorhon, 2017). Proper decision making enhances efficient and effective supply chain performance system through proper administration of supply chain (Rieckhof, Bergmann & Guenther, 2015).

One of keys aspects of a successful company is the ability to quickly and effectively react to changes in the supply chain. The supply chain is a system consisting of independent economic subjects which are oriented to various fields of activities (Stadtler, Kilger, 2008). The system‘s internal structure is complex and individual internal elements are connected in many different ways. Therefore, the demand for creating a systematic approach for managing sales, ordering, logistics and others has increased.

2.2 Concept of Electronic Logistics

Logistics is that part of the supply chain process that plans implements, and controls the efficient, effective flow and storage of goods, services, and related information from the point-of-origin to the point-of-consumption in order to meet customers' requirements (Kozlenkova *et al*., 2015). Electronic–logistics is the logistical process that governs everything related to the online marketplace (Samah, Siti & Gopal, 2015). It is a dynamic set of communication computing and collaborative technologies that transform key logistical processes to be customer-centric by sharing data, knowledge and information with supply chain partners. It helps in coping with newly arising logistics challenges. The key elements of e-logistics are multi-channel operation, cross border functionality, warehouse layout and inventory, planning and forecasting and performance management (Pu, Chan & Chong, 2016).

Success in e-logistics depends on the focus selected for the online shop. Proper collaboration, transparent communication with customers for delivery and returns are the other key factors that determine the success of e-logistic (Hallberg & Krysen, 2015). Electronic-logistics also enables synchronization of events and right decision-making. The ultimate objective is to deliver the right products in right quantities at the right place and time to the right customers (Ross, 2016). E-Logistics leverages the power of the internet and other technologies (such as wireless) to provide robust information to supply chain participants and offer unprecedented levels of visibility across the entire supply chain.

A growing number of e-logistics solution providers and service companies are tapping into this opportunity by addressing logistics issues such as supplier selection, asset utilization, pricing, inventory management, order visibility, and order fulfillment (Lambert, Riopel & Abdul, 2011). Start-ups, software companies, and old economy logistics providers are bringing to market a variety of products and services that address the huge logistics inefficiencies burdening today's supply chains. Although the importance of managing the digital supply chain and information is obvious, many organizations are lagging behind, unable to take full advantage of fast-paced technological developments (Teece, 2010).

Many do not have a systematic overarching IT architecture that translates business strategy into strategic information-processing capability. In fact, many business organizations still struggle with the basic concepts of data use. For instance, many face issues concerning data reliability, timeliness, completeness and authenticity. Electronic-logistics improvement initiatives enabled by logistic companies include inventory management, reverse logistics optimization, performance measurement and other efforts (Grant, Trautrims & Wong, 2017).

In the past, such efforts have been extremely burdensome to implement due to limited logistics data. However, armed with meaningful logistics information, management can bring their logistics operations out of the dark ages and into new era. This will improve the overall responsiveness of their supply chains and create a new source of advantage to ensure competitiveness in today's dynamic high-tech manufacturing marketplace.

2.3 Theoretical Review

The study used the innovation diffusion theory, technological determinism theory, queuing theory and resources-based view theory.

2.3.1 Innovation Diffusion Theory

Rogers' Diffusion of Innovation Theory (Rogers, 1995) seeks to explain how new ideas or innovations are adopted, and this theory proposes that there are five attributes of an innovation that effect adoption: relative advantage, compatibility, complexity, trial-ability and observability. Relative advantage is the degree to which an innovation is perceived as being better than the idea it supersedes. Rogers' theory suggests that innovations that have a clear, unambiguous advantage over the previous approach will be more easily adopted and implemented.

Current research evidence indicates that if a potential user sees no relative advantage in using the innovation, it will not be adopted (Greenhalgh, 2004). Compatibility is the degree to which an innovation fits with the existing values, past experiences, and needs of potential adopters. There is strong direct research evidence suggesting that the more compatible the innovation is, the greater the likelihood of adoption (Greenhalgh, 2004). Complexity is the degree to which an innovation is perceived as difficult to understand and use.

Furthermore, Rogers suggested that new innovations may be categorized on a complexity-simplicity continuum with a qualification that the meaning or the relevance of the innovation may not be clearly understood by potential adopters. When key players perceive innovations as being simple to use the innovations will be more easily adopted (Greenhalghl, 2004). Trial ability is the degree to which an innovation may be experimented with on a limited basis. Because new innovations require investing time, energy and resources, innovations that can be tried before being fully implemented are more readily adopted.

Finally, observability is the degree to which the results of an innovation are visible to the adopters. If there are observable positive outcomes from the implementation of the innovation then the innovation is more adoptable. The relevance of the theory outlines the adoptability of logistic companies to generate and implement E- tendering systems that suits the organization in terms of operationalization and functionality of product in transit. For this reason, the complexity, compatibility, trial ability and observability of the innovation ideas definitely can lead to supply chain performance and even development of new innovation in future times.

2.3.2 Technological Determinism Theory

Technological Determinism Theory was developed by Thorstein Veblen (1857–1929), an American social scientist. Technological determinism (TD), is a reductionist theory and states that technology is a social structure or a force which drives change. TD changes the organizational culture, structure, reporting line, norm and many other aspects including the modes of operations. The two main hypotheses that technological determinism depends are; belief that the technical base of a society is the fundamental condition affecting all patterns of social existence, second belief is that technological change is the single most important source of change in a society.

Critics like (Chandler, 2000) states that other than technological issue other factors have driving forces and some of them include political issues, class interests, economic pressures, educational background, general attitudes and others. TD has also had a long and controversial history in the social sciences in general and in organization studies in particular. Technological Determinism Theory is important to the study since it is discussed based on the effect of automated warehousing operations systems on supply chain performance and it argue variously that automation itself is socially determined, that technology and social structures co-evolve in a nondeterministic, emergent process, or that the impact of any given technology depends mainly on how it is implemented which is in turn socially determined. The electronic logistic management system gives a company the benefits of lower costs, increased efficiencies, fewer injuries, maximum sustainable returns on operating assets, and an enhanced competitive position (Jeronimo, Antunes & Filho, 2016).

2.3.3 Queuing Theory

Queuing theory was engineered by Erlang in 1909. Queuing theory has been developed largely in the context of telephone traffic. Queuing theory is a branch of applied probability theory used to describe the more specialized mathematical models for waiting lines or queues. Assumptions of queuing theory are that it used Queuing models to represent the various types of Queuing systems that arise in practice. The models enable finding an appropriate balance between the cost of service and the amount of waiting. Queuing models find applications in a wide variety of situations that may be encountered in health care, engineering, and operations research (Gross and Harris, 1998).

Critic show that queuing networks find a wide application in many spheres of life such as manufacturing systems, computer networks, telecommunications, transport, logistics and the like. A series of interconnected stations for serving in which each user, after departing from a particular station, can pass into another one or exit from the whole system is called the networked queuing system. The probability and statistical methods are the most frequently used tools for the system performances determination. Queuing systems can be described as called upon by particular entities (users) who ask for services. In each serving system we can distinguish arrival process, service process and one or more service stations or servers. The general assumption is that one station cannot at the same time serve two or more arrival entities. If the station is busy, the user has to wait for service.

At the very moment when the station becomes free, the entity is taken over from the queuing according to the pre-defined rules – discipline in the queues – and its service is done. During the service, the entities can pass from one or more service states before departing from the system. Queues are usually characterized by the arrival pattern (Poisson, deterministic or a general distribution), Service pattern (constant, exponential, hyper exponential, hypo-exponential or general distribution), number of servers (single server or multiple servers), maximum system capacity (number of customers in a system can range from one to infinity), population size (queue can have infinite or finite length) and queue discipline (order of service delivery can be First In First Out (FIFO), random order, Last In First Out (LIFO) or priorities). To incorporate these features, Kendall (1953) introduced a Queuing Notation A/B/C/X/Y/Z in where: A is the inter-arrival time distribution, B is the service time distribution, C is the number of servers, X is the system capacity, Y is the population size and Z is the queue discipline.

Queuing theory is important to the study since it aligns itself with Electronic order processing. The ultimate objective of the analysis of queuing systems is to understand the behaviour of their underlying process so that informed and intelligent decisions can be made by the management. The application of queuing concepts is an attempt to minimize cost through minimization of inefficiency and delays in order processing.

2.3.4 Resource Based View Theory

Resource Based View Theory was developed by Wernerfelt in 1984. Resource Based View Theory of strategy emphasize the people element in strategy development and highlight the motivation, politics and cultures of organizations and the desires of individuals (Jackson, 2014). Resource based business strategy theories provide an inside out approach to strategy formulation, emerging to help explain many of the firm performance results that could not necessarily be traced to industry level factors proposed by industry-based theories. Resource-based theories promote development of business strategies that can leverage a firm's unique resources.

Although Wernerfelt originally coined the term resource-based view as a useful alternative to product-based strategic analysis, it was Barney (1991) who most fully developed and formalized RBV theory and proposed its significance for business strategy. Firm resources are defined broadly in the RBV and include all physical resources, human resources, information resources, organizational processes, and even organizational capital resources (internal and external relations) that can be leveraged by a firm for competitive advantage. Certain resources may represent unique firm strengths that can be leveraged for competitive advantage. Two key assumptions underlying the RBV are that resources are not homogeneous nor are they perfectly mobile between firms in an industry (otherwise firm capabilities would be equal and no one firm within an industry would achieve a competitive advantage over the others).

Four characteristics (the VRIN attributes) describing a firm's resources are relevant to how they may result in a competitive advantage or sustainable competitive advantage for the firm: valuable, rare, inimitable, and no substitutable**.** Assuming that resources are heterogeneously distributed throughout the firms in an industry and imperfectly mobile between firms, firms with valuable and rare resources will achieve a competitive advantage. A sustainable competitive advantage can be achieved when the valuable and rare resources can be protected from imitation and substitution

Critics on human resourced based theory states that the consideration of the impact of resource availability and value on firm competitive advantage emphasized by RBV has remained influential within the strategic literature, but as a theoretical platform RBV has faced many challenges, leading to a lively ongoing debate and continued refinement of RBV concepts, definitions, and applications. One major area of controversy for RBV has been definitional problems in its conceptualization. Priem and Butler observed that because valuable resources and competitive advantage are defined in the same terms, a tautological problem exists within the originally conceived constructs, which compromises RBV's falsifiability.

The theoretical generalizability of RBV due to its emphasis on resource uniqueness has also been challenged, though as Levitas and Ndofor point out, more refinement of operationalization approaches and empirical testing is required before RBV is even ready for generalization. Perhaps the most significant criticism of RBV is that it is missing the external market perspective. Just as proponents of RBV have criticized the industry-based competitive advantage view for making restrictive assumptions regarding resources, RBV does exactly that regarding the product-market environment.

Whereas the industry-based view assumes resource homogeneity and mobility among firms in the industry, RBV makes similar assumptions regarding demand. Because it is actually the external market environment that ultimately determines whether a particular resource is truly valuable, as the market changes, so may the relative value of resources. To control for this, RBV makes the implicit assumption of homogeneity and immobility of product markets. To be relevant to competitive advantage, firm resources must be valuable**,** meaning they have power to create or leverage opportunities or minimize threats inherent in the firm's operating environment.

Rarity speaks to the uniqueness of a firm's resources. The more ubiquitous a given resource is throughout an industry, the less likely that resource is to provide any one firm with a competitive advantage. Rare and valuable resources that are hard to imitate may enable a competitive advantage to not only be achieved, but also to be sustained over longer periods of time. Some resources may be difficult for competitors to imitate because the true nature of its link to potential competitive advantage is misdiagnosed or misunderstood, either by the competitor or even by the firm itself, a condition referred to as causal ambiguity.

2.4 Link between E-Logistic and Supply Chain Performance

Logistics is the management of the flow of goods between the point of origin and the point of consumption in order to meet some requirements, for example, of customers or corporations. Supply chain performance refers to the extended supply chain's activities in meeting end-customer requirements, including product availability, on-time delivery, and all the necessary inventory and capacity in the supply chain to deliver that performance in a responsive manner (Estampe, Lamouri, Paris & Brahim-Djelloul, 2013).

The terms of logistic and supply chain performance are usually comparative in academy and industry, since both of them are closely relevant to the product circulation during its whole life cycle, and both have been regarded as the central unit of competitive analysis of model management science. Generally speaking, supply chain is a more broadened conception with a wider range which can involve other similar subjects, such as network sourcing, supply pipeline management, value chain management, and value stream management (Bruns, Goerigk, Knust & Schobel, 2014).

In E-logistics process, three components come into play: Request for Quotes (RFQ), Shipping and Tracking. The Logistics intercommunicate with the business process manager in an e-commerce server (Yong, 2017). It is the role of the business service manager to invoke the RFQ (request for Quote) process. After getting the response, the Purchas electronic order is updated, after which the shipping process is invoked by the business process manager. Once the products are shipped for the specified destination, the tracking number is then provided to the customer.

An important issue in supply chain performance is that companies will not seek to achieve cost reductions or profit improvement at the expense of their supply chain partners but rather seek to make the supply chain as a whole more competitive. Hence, the contention that it is supply chains, and not a single company, that compete is a central tenet in the field of supply chain performance. According to Alves Filho *et al*. (2004), supply chain performance originated mainly from the developments in logistics. One of the main assumptions by supply chain performance is that an efficient bidirectional flow of products (goods and services) and information must take place between all the companies belonging to the chains (Lambert *et al*., 1996).

On the other hand, logistics implements and controls the effective and efficient flow and storage (in both directions) of goods, services and related information. Also, Pires; Ayres (2000) argue that companies which implement valuable supply chain performance partnerships believe that such relations encompass more than logistics. According to Maia (2006), supply chain performance is involved with defining supply chain structure, which, in turn, creates the framework inside which all logistical operations take place. For example, supplier location (supply chain performance issue) have a direct impact on the in-house inventory levels a client must hold, once that hypothetically, distant suppliers imply high transportation lead-times, which imply high inventory levels.

The inverse influence (logistics affecting supply chain performance) can also be conceived of, once that, for example, the usage of transportation methods with shorter lead times (logistics issue) may allow a company to outsource its products to more distant suppliers (supply chain performance issue), without jeopardizing inventory costs. This study will focus on E- tendering, automated warehousing operations systems, electronic order processing and enterprise resource planning

2.4.1 E- tendering and Supply Chain Performance

E-tendering is an online process that manages the tendering cycle from the advertisement of the notice straight through to the issuing of an award (Osir, 2016). It provides a centralized process to help organizations improve efficiencies and accountability while reducing traditional tendering costs and increasing supply chain performance (Chen & Kitsis, 2017). E-tendering- is the process of sending Request for Invoices (RFIs) and Request For Purchases (RFPs) to suppliers and receiving the responses of suppliers back, using internet technology hence improving supply chain performance (Kamarulzaman & Eglese, 2015).

Usually e-tendering is supported by an e-tendering system often the e-tendering system also supports the analysis and assessment of responses. E-tendering does not include closing the deal with a supplier. E-tendering smoothens a large part of the tactical purchasing process without focusing on the content that is spending category of that process (Nurwin, 2018). An electronic based process wherein the complete tendering process; from advertising to receiving and submitting tender-related information are done online. This enables firms to be more efficient in their supply chains as paper-based transactions are reduced or eliminated, facilitating for a speedier exchange of information thus high supply chain performance (Ibem & Laryea, 2017).

E-tendering has been most commonly used by government agencies and the public sector rather than by the private sector. However, with increasing numbers of both business customers and consumers turning to the internet to research goods and services before making a purchase, e-Tendering is becoming a successful and efficient sales channel for a variety of organisations hence more efficient supply chain performance (Rotich, Muma & Waruguru, 2015). In current era, Security is always prime thing to achieve in almost all aspects of business and organizations.

Most of the businesses are tending towards remote transactions with the aid of web based computer systems (Khattak, Shah, Khan, Ali & Imran, 2019). For the remotely controlled business, e-Tendering becomes most efficient and prominent approach. This process involves a seller, a buyer and a mediator web based computer system. To achieve this, there must be a secure environment to maintain integrity of data and the confidentiality of the concern business. To achieve high security measures in e-Tendering, Public Key Infrastructure is implemented for the robust security and the process to provide secure web-based environment guarantees the reliability of the overall system.

It also used asymmetric encryption/decryption technique to offer high shielded environment, (Malik, 2013). Companies with authority to issue digital certificates play a crucial role in e-Tendering. In E-tendering process buyer and bidder act as key persons (Khorana, Ferguson-Boucher & Kerr, 2015). When this process begins buyer and bidder both have to be registered for accessing web portal of E-tendering. Without registration a buyer cannot publish tender as well as bidder cannot bid for the tender. According Malik (2013), E-Tendering to be affected, Registration process, Submission process and Bid evaluation process are necessary. Bid evaluation process will be carried out at buyer end where the buyer will create the committee. This committee is responsible for bid opening. After analyzing the entire bid will be evaluated and comparative report will be generated and result will be shared and appropriate supplier will get the award of contract.

2.4.2 Automated Warehousing Operations Systems and Supply Chain Performance

Granlund and Wiktorsson (2014) in their study noted that automation in internal logistics is an enabler to increase overall competitiveness in an organization. They focused on highlight the existing strategic and operational challenges to using and developing automation in internal logistics. A three-phased empirical study was conducted, including case studies and a survey. The findings reveal a lack of responsibility for, and insight in current state of logistics operations as well as a lack of vision and strategy giving directions for desired future state of operations (Granlund & Wiktorsson, 2014). In addition, the actual automation projects are hindered by poorly defined and supported processes. It is concluded that functional strategies for internal logistics and automation can give the support needed along with process models for automation projects.

The content and application of these strategies and models are suggested (Chang, 2016). Laudon and Laudon (2016) examined Warehouse Management System (WMS) practices and their effects on operations. They analyses the relationship between adoption of WMS to its impacts on business performance and competitive advantage of a regional distribution centre. In terms of business performance, the focus is placed on various competitive cores of distribution centre. WMS was found has a positive impact on companies' performance on operations management measures. To adopt the MIS, wireless barcode embedded WMS in specific, it is necessary to have corporate culture that supports complex operational activities (Kurnia, Karnali & Rahim, 2015).

WMS implementation is crucial in bringing cost reduction in operational level, effective management in management level, as well as improvement of the company's competitiveness in strategic level. Companies that manage warehousing of their products are expected to implement WMS in order to maintain their competitive edge in the global market place (Weerd, Mangula & Brinkkemper, 2016). Mukolwe and Wanyoike (2015) Assessed of the effect of logistics management practices on operational efficiency at Mumias sugar company limited, Kenya. The study findings indicated that Automation of warehousing activities greatly enhances accuracy, speed of operations and reduces wastage. Transport management and physical distribution practices on the other hand allows faster and cost-effective flow of goods and raw materials thus improving operational efficiency. The study recommends a strategic approach to logistics management practices through embracing modern technology and employee training (Ragu, Ragu & Rao, 2016).

2.4.3 Electronic order Processing and Supply chain performance

Order processing is a crucial element of order fulfillment and first stage of the fulfillment cycle. Order processing, using range of clear procedures, represent the basis

of all logistics systems which makes it a key factor in logistics operations. Order processing starts with the receipt of or purchase requisition from the customer. E-ordering enables network members and their suppliers to exchange EDI documents: POs, acknowledgements, advanced Shipment Notices and Invoices electronically Provides means for centralized billing by suppliers to members, Reporting solutions: Fill Rate Management, Price Discrepancies, Standardization – POs, ASNs, Invoices, Drill-Down reports, Internet Parts Ordering , a single website for special orders, All documents can be viewed by your staff on the EOP website, Archive – All documents for 7 calendar years plus the current year, Track shipments, approve invoices for payments, manage all online (Mutangili, 2014).

Order processing is the term used to identify the collective tasks associated with fulfilling an order for goods or services placed by a customer and it formed the basis for the information flow in a logistics system (Christopher, 2010). It had three principal functions that is create a flow of information that preceded the goods, accompanied them and followed them (Christopher, 2010). The importance of accurate information to achieving superior logistical performance had historically been underappreciated. While many aspects of information were critical to logistics operations, the processing of orders was of primary importance ((Bowersox, *et al*., 2010).). Failure to fully comprehend this importance resulted from not fully understanding how distortion and operational failures in order processing impact logistical operations (Bowersox, *et al*., 2010).

Order processing is the term used to identify the collective tasks associated with fulfilling an order for goods or services placed by a customer (Stevenson, 2009). The order processing system is the communications network which provides information necessary for the management of the interfaces between logistics and the other

functional areas of the firm as well as within logistics (Pfohl, 2004). The order processing procedure begun with the acceptance of the order from the customer, and it's not considered complete until the customer receives the products and determined that orders have been delivered accurately and completely (Stevenson, 2009).

It has three principal functions for a firm it created a flow of information that preceded the goods, accompanied them and followed them (goods) (Mangarulkar, *et al.,* 2012). The benefit of fast information exchange is directly related to work balancing. Bowersox, *et al*., (2010) stated that, it made little sense for a firm to accumulate orders at a local sales office for a week, mail them to a regional office, process the orders in a batch, assign them to a distribution warehouse, and then ship them via air to achieve fast delivery. In contrast, Internet transmission of orders direct from the customer, combined with slower, less costly transportation, achieved even faster and more consistent delivery service at a lower total cost (Bowersox, *et al*., 2010).

Quick, accurate processing had a favorable effect on the entire flow of goods. As a result, a firm should always pay special attention to efficient processing. The capability and efficiency of order processing should have been evaluated regularly using indicators that tracked the reliability and flexibility of order handling (Pfohl, 2004). In most supply chains, customer requirements were transmitted in the form of orders. The processing of these orders involved all aspects of managing customer requirements, including initial order receipt, delivery, invoicing, and collection.

The more quickly an order was transmitted, entered and processed, the more time (lead time) management had for planning transportation and inventory activities while meeting the required customer service levels. The logistics capabilities of a firm could be as good as its order processing competency and more so when managed efficiently.

Macharia *et al*. (2015) examined the effects of information technology on Logistic firm's performance in Nairobi Kenya in order to realize its significant impact on their operations in order to guarantee their profitability and growth. Bae (2016) examined the moderating effect of logistics information systems (LIS) on inter-organizational collaboration (IOC) and performance.

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

2.4.4 Enterprise Resource Planning and Supply Chain Performance

Effective distribution requirement planning is described as a comprehensive set of processes, which engages all people in a company on process improvements in movement of goods. Distribution requirement planning has not been given the recognition it deserves in developing countries, in most retail sector, regardless of the effort by the partners like the World Bank, the International Trade Organization, the United Nations Conference on Trade and Development, the World Trade Organization

and others. This could be deliberate or sheer ignorance on the value distribution requirement planning could contribute to any organization (Boer, 2007).

According to Wayne (2002) delaying will worsen the already deteriorating performance, loss of professionals, and organizations will continue incurring unnecessary costs. However, it is important that appropriate performances are implemented. It should not be any performance. The issue of basing on financial performance and neglecting or ignoring non-financial performance is not helping distribution requirement planning because only partial performance is considered. Distribution is the purposeful application of information in the design, production, and utilization of goods and services and in the organization of human activities.

The role of distribution in shaping access to value chains should be understood in relations to changing features consumption. Consumption is increasing characterized by food user safety awareness of the parallel prices of globalization and localization of consumer tastes, social and environment concern. There has been increased important for issues of innovation may be seen as a question of competition or corporation. Innovation entails tangible, intangibles, high and intermediate (John, 2000).

Effective distribution requirement planning has been the fundamental business strategy of the world's leading organizations throughout and has continued to be a major competitive advantage of the decade. Effective distribution requirement planning requires organizations to design their distribution with knowledge of their customer requirements. This involves operations, marketing, and sourcing and support activities to meet customer expectations and to increase company performance. There

is growing evidence that improvements in innovation leads to increases in productivity, performance and profits (Williamson, 2001).

While functions like human resource and finance can have their performance measured, this is not the case with distribution requirement planning. The failure to establish performance of distribution requirement planning has led to irregular and biased decisions that have costly consequences to every entity. The need to have coherent methods of performance of distribution requirement planning in retail sector, particularly in developing countries, has never been as sound as it is now (Wright, 2005). Distribution requirement planning used clusters to model distribution structures within a site and/or between related sites. A cluster is a group of entities such as warehoused/ work centers.

A cluster normally represents a geographical location, consisting of one or more warehoused (usually non-net table warehoused) that are considered as one unit for planning purposes. Clusters are used to specify groupings of entities so that relationships between entities can be defined. Entities belonging to a cluster do not have to belong to the same financial and / or logistic company of an organization. The notion of a clustered item is comparable to that of an item/warehouse combination under inventory module. The major difference is that a cluster can be an aggregate several warehoused.

The concept of cluster is best illustrated by the following Example. Suppose distribution centers of a large retail organization are grouped into i) north, ii) south iii) east and iv) west clusters. All of them, in addition to getting some local supplies, are largely supplied by distribution orders from a central warehouse (Omondi, 2006). Supply planning is the next important element of distribution requirement planning,

which comprises of following: Supply sources which can be covered with three types of orders: production orders, distribution orders and purchase orders. Distribution orders move the goods between clusters.

Distribution orders are especially suitable for the situation where depots/ sales channels of an organization are spread throughout a large area. Goods flow strategies they are optimized with: supply chain strategies, sourcing strategies and supply strategies. The sourcing strategy determines whether a requirement is covered by production orders, distribution orders, or purchase orders. A combination of these sources is also possible. If the source is distribution, the system selects the suppliers (depots) on the basis of supply strategies for internal suppliers (Pettigrew, Woodman, & Cameron, 2001).

According to Jessop (2004) supply strategy is the method by which the supply of plan items is divided over multiple suppliers. The supply strategy defines the priority rules and allocation rules that direct the planning engines in the choice of suppliers. There are separate supply strategies for external suppliers planned purchase orders and for internal suppliers planned distribution orders supply chain strategy: The sourcing strategies and supply strategies are grouped in supply chain strategies. Supply chain strategies can be linked to scenarios and remains valid during a certain time period within that scenario. This functionality enables to flexibly change business strategy over time such as percentage of items to make, buy or distribute.

Demand planning system is the ability to create a demand plan, based on historical sales data. The demand plan resulting from this function is the starting point for supply planning. The demand plan contains forecasted demand for an item, using standard forecasting methods. If the past data is inappropriate or insufficient, the forecast is

entered manually. Good connectivity between the end-customer and manufacturer through which the manufacturer has direct access about end-customer order in order to enable them to make better forecast and better respond to the customer inventory and adoption of procurement performance, customer who is the retailer will provide manufacturer with demand forecast, which were used to determine stock up level and fill rate at customer's site.

Demand volatility is key problem faced by most supply chain nowadays. Poor service level between firm and supplier may be influenced by a number of factors such as demand uncertainties, different planning calendars used by firm and supplier, un-notified product shortage and conflicting performance measures (Ochieng, 2008). According to the findings of Southard (2002) he concludes that by using customer demand in implementing procurement performance, a firm may help reduce firm costs in the whole supply chain.

Higher demand variability will lead supplier in to inefficiency in delivering product and increase delivery costs. Eliminating one layer of information flow (supplier knowing demand outlook originally from end-customer through firm), demand variability for supplier has been reduced by 75% to 26% .This eventually reduced supplier cost through optimization of delivery schedule, on time product delivery and substantial inventory reduction, improved supplier lead-time more predictable replenishment visibility and increased supplier performance in delivering correct product mix (Powell, 2008).

Master based planning is a time-phased planning concept where demand, supply, and inventory for an item are maintained over a planning horizon which is divided into time buckets or plan periods. The length of these plan periods can vary. Periods with

a fixed length throughout the planning horizon can be used, but it is also possible to use shorter periods (for example, days or weeks) for the immediate future and longer periods (for example, months) for longer-term planning. The time-phased demand, supply, and inventory information for an item is generated through master-based planning.

This means that one level of order batching is removed, allowing a more accurate, more rapidly available, and more level demand information. On top of it, the supplier is free to choose the timing of the replenishment shipment such as the supplier can delay non-critical product during sudden ramp on certain product by end-customer (Liker, 2001). According to Sandy (2009) indicated that most frequent information that was shared between supplier and firm are demand forecast, inventory level and supplier lead time. Procurement arrangement has the potential of generating significant benefit of reducing operation costs by sharing of information.

Average improvement of information sharing gives arrange of 0.4% to 9.5% of savings in reduction of supplier costs. Procurement performance has enabled the customer's partnership channel to be more efficient due to better planning coordination, reduced needs for inventories with increased sales by focusing on selling what end-customer wants. In general, demand planning system is considered a means to obtain transparency in the supply chain and there by a means to dampen the demand variability.

Looking at the findings of Lennon (2006) he indicates that procurement performance does not only rest on exchange technology but also to what extent the supplier is able to utilize the advance demand information received for planning purposes. Theoretically, the supplier could be able to utilize information about future demand

both to smooth manufacturing capacity in his own production system, negotiate better purchasing agreements with his sub suppliers and plan for economic full truck load distribution. Data must be reliable to benefit from data utilization. If for instance forecasts are unreliable and inventory level status is old the supplier should not apply this data for planning purposes and suggests that under these circumstances' procurement performance would offer no more benefits than traditional replenishment. The main control processes identified in the frameworks may imply sharing of different types of demand planning system both internally and with participants in the supply chain.

Forecasts and order information from customers constitute essential information in most levels for forecasting the future demand. As both customers and suppliers often are interested in forecasting their own activities, information such as delivery and production plans can also be shared in the supply chain. Information regarding inventory a draw material levels in stock may also be shared regularly with customers and suppliers. Exchange of information related to ordering and invoicing also involves customers and suppliers (Dickson, 2006). Inventory scheduling system is the process of arranging, controlling and optimizing work and workloads in a production process or manufacturing process. Inventory scheduling system is used to allocate plant and machinery resources, plan human resources, plan production processes and purchase materials.

Given that inventory in all its forms generally represents one of the top three expense lines for nearly all companies, there is a universal need for applying the right discipline to each step in the process. While in the perfect world, all inventories are consumed daily, we must operate businesses in a less than perfect environment. The challenge is: how close can you get to perfect before Just in Time inventory scheduling system

becomes a little too late. Inventory scheduling system in its most efficient form incorporates many different technical applications of inventory scheduling system models.

Such concepts as safety stock, economic ordering quantity, cost of goods, inventory turnover, customer managed inventory and a vendor managed inventory, whole spectrum of underlying inventory scheduling system tools play a critical role in what is inventory scheduling system (Migwi, 2012). While the key principles of inventory scheduling system remain the same across all industries, the areas which require emphasis vary from sector to sector. Learning to apply the right inventory scheduling system tools is part of executing the art and science of what is inventory scheduling system. Effective inventory scheduling system depends on understanding all the details of what is inventory scheduling system.

By applying lean practices to all aspects of the inventory scheduling system cycle, businesses can reduce investment in standing inventory, plant rental, shipping costs, reverse logistics while maintaining or improving customer service levels and in-stock metrics on critical inventory. This is the result of having what your need, when you need it, where you thought you had it. That is the core standard by which to measure the results of your businesses inventory scheduling system program (Green, 2005).

Inventory scheduling system, or inventory control, is an attempt to balance inventory needs and requirements with the need to minimize costs resulting from obtaining and holding inventory. There are several schools of thought that view inventory and its function differently. These will be addressed later, but first we present a foundation to facilitate the reader's understanding of inventory and its function. Inventory is a quantity or store of goods that is held for some purpose or use the term may also be

used as a verb, meaning to take inventory or to count all goods held in inventory. Inventory may be kept in-house, meaning on the premises or nearby for immediate use; or it may be held in a distant warehouse or distribution center for future use.

With the exception of firms utilizing just-in-time methods, more often than not, the term inventory implies a stored quantity of goods that exceeds what is needed for the firm to function at the current time (Davis, 2003). Inventory scheduling system is the process of efficiently overseeing the constant flow of units into and out of an existing inventory. This process usually involves controlling the transfer in of units in order to prevent the inventory from becoming too high, or dwindling to levels that could put the operation of the company into jeopardy.

Inventory scheduling system also seeks to control the costs associated with the inventory, both from the perspective of the total value of the goods included and the tax burden generated by the cumulative value of the inventory. The first aspect has to do with time. In terms of materials acquired for inclusion in the total inventory, this means understanding how long it takes for a supplier to process an order and execute a delivery. Inventory scheduling system also demands that a solid understanding of how long it will take for those materials to transfer out of the inventory be established.

Knowing these two important lead times makes it possible to know when to place an order and how many units must be ordered to keep production running smoothly (Dobler, 2008). Calculating what is known as buffer stock is also key to effective inventory scheduling system. Essentially, buffer stock is additional units above and beyond the minimum number required to maintain production levels. For example, the manager may determine that it would be a good idea to keep one or two extra units of

a given machine part on hand, just in case an emergency situation arises or one of the units proves to be defective once installed.

Creating this cushion or buffer helps to minimize the chance for production to be interrupted due to a lack of essential parts in the operation supply inventory. Inventory scheduling system is not limited to documenting the delivery of raw materials and the movement of those materials into operational process. The movement of those materials as they go through the various stages of the operation is also important. Typically known as a goods or work in progress inventory, tracking materials as they are used to create finished goods also helps to identify the need to adjust ordering amounts before the raw materials inventory gets dangerously low or is inflated to an unfavorable level (Dobler, 2008).

Finally, inventory scheduling system has to do with keeping accurate records of finished goods that are ready for shipment. This often means posting the production of newly completed goods to the inventory totals as well as subtracting the most recent shipments of finished goods to buyers. When the company has a return policy in place, there is usually a sub-category contained in the finished goods inventory to account for any returned goods that are reclassified as refurbished or second grade quality.

Accurately maintaining figures on the finished goods inventory makes it possible to quickly convey information to sales personnel as to what is available and ready for shipment at any given time. In addition to maintaining control of the volume and movement of various inventories, inventory scheduling system also makes it possible to prepare accurate records that are used for accessing any taxes due on each inventory type. Without precise data regarding unit volumes within each phase of the overall operation, the company cannot accurately calculate the tax amounts. This could lead

to underpaying the taxes due and possibly incurring stiff penalties in the event of an independent audit (Larry, 2010).

2.5 Summary of Literature and Gaps

This chapter has addressed literature related to Electronic Logistics components. Rushton, Croucher and Baker (2014) focused on role of transportation networking system in logistics for the reference of further improvement. The producers could immediately give the products over to the terminal customers. Green *et al*. (2015) assessed a logistics performance model incorporating logistics performance as the focal construct with supply chain performance strategy as antecedent and organizational performance, both marketing and financial, as consequences.

To compete at the supply chain level, manufacturers must adopt a supply chain performance strategy. Such a strategy requires integration and coordination of key external processes such as purchasing, selling, and logistics with supply chain partners (Christopher, 2016). Organizational managers are being asked to focus directly on supply chain functions such as logistics to bolster the competitiveness of the supply chains in which their organizations are integral partners (Hugos, 2018).

Lii and Kuo (2016) analyzing data from almost 2,000 firms in the USA, Australia, Japan, and Korea, they found that efficient supply chains exhibit transportation network system and responsive supply chains exhibit collaborative closeness (Chiang, Chen & Wu, 2015). Japanese and Korean firms were more likely to integrate supply chains based on transportation network system, while US and Australian firms were more likely to integrate supply chains on the basis of collaborative closeness (Fayezi, Zutshi & O'Loughlin, 2015).

Granlund and Wiktorsson (2014) in their study noted that automation in internal logistics is an enabler to increase overall competitiveness in an organization. They focused on highlight the existing strategic and operational challenges to using and developing automation in internal logistics. A three-phased empirical study was conducted, including case studies and a survey. The findings reveal a lack of responsibility for, and insight in current state of logistics operations as well as a lack of vision and strategy giving directions for desired future state of operations (Granlund & Wiktorsson, 2014).

Queuing models find applications in a wide variety of situations that may be encountered in health care, engineering, and operations research (Gross and Harris, 1998). Critic show that queuing networks find a wide application in many spheres of life such as manufacturing systems, computer networks, telecommunications, transport, logistics and the like. A series of interconnected stations for serving in which each user, after departing from a particular station, can pass into another one or exit from the whole system is called the networked queuing system. The probability and statistical methods are the most frequently used tools for the system performances determination.

Most of the above studies have dwelt on information technology on logistic performance information flow, logistics integration, inventory management system and fleet management system logistics performance model incorporating logistics performance as the focal construct with supply chain performance strategy unlike this study which seek to investigate the effect of electronic logistics on supply chain performance of Logistic Companies in Kenya. Since none of the above studies has addressed the issue under investigation, this study has identified a gap in knowledge

hence precisely focused on the relationship between electronic logistics and supply chain performance of Logistic Companies in Nairobi.

2.6 Conceptual Framework

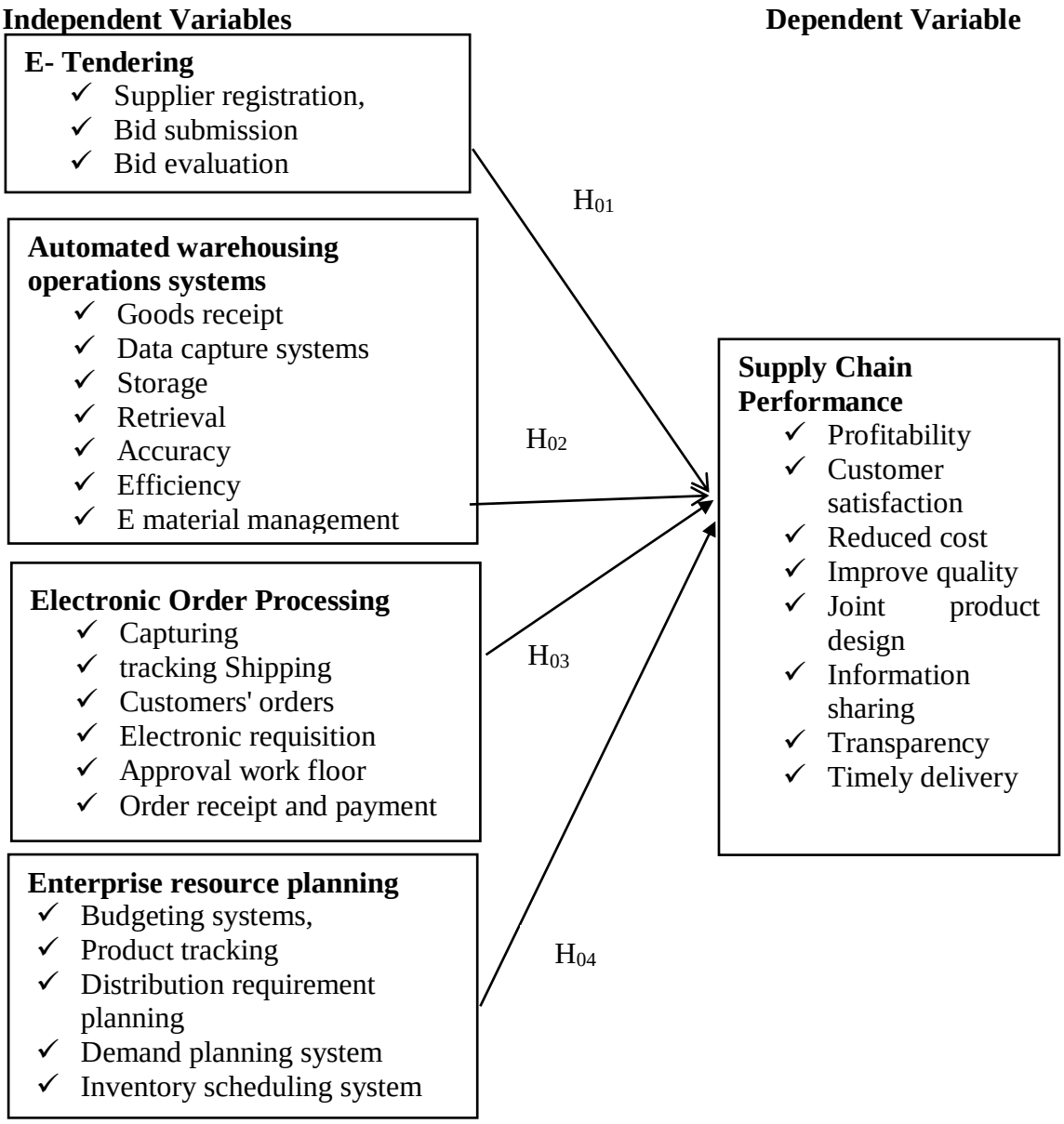

Figure 2.1 Conceptual Framework

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Overview

This chapter covers the research design, study area, target population, sampling design, types of data and collection instruments and procedure, reliability and validity of research instruments, data processing, analysis, presentation and ethical consideration.

3.2 Research Design

According to Miles and Huberman (2004) research design is a plan for collecting and utilizing data so that desired information can be obtained with sufficient precision. The study adopted exploratory survey research design. Exploratory research design entails merely formative examination into a subject for the purpose of gaining new insights, discovering new ideas and increasing new ideas (Saunders *et al*., 2012). The design was chosen because the main aim of the study is to identify causal relationship between independent variables and dependent variable that pertain the research problem. Using this design resulted in rich data that is collected in large amounts (Creswell & Creswell, 2017).

3.3 Research Area

The study was done from logistic companies in Nairobi County, Kenya, as from the beginning of July to December 2019. Nairobi County is one of the 47 counties of Kenya. Today, logistics companies in Nairobi hold the key to the development of the economy of Nairobi and country to a great extent. This because logistic companies in Nairobi are experiencing supply chain performance challenges which prompt the researcher to look at effect of electronic logistics on supply chain performance of logistic companies in this area.

3.4 Target Population of the Study

The target population refers to the group of people or study subjects who are similar in one or more ways and which forms the subject of the study in a particular survey (Orodho, 2003). The target populations for this study was employees of the 1672 logistic companies in Nairobi County (Company Registrar Nairobi County, 2019). Therefore, the accessible population for this study was 1672 operational managers of logistic companies in Nairobi County.

3.5 Sample Size and Sampling Procedure

Sample size refers to the number of observations or replicates to include in a statistical sample (Orodho, 2003). The sample size is an important feature of any empirical study in which the goal is to make inferences about a population from a sample. Sampling technique refers to a procedure of selecting a part of population on which research can be conducted, which ensures that conclusions from the study can be generalized to the entire population. The researcher obtained sample size using Yamane formulae (1967).

$$n = \frac{N}{1 + N(e)^2}$$

Where n is the sample size required

N is the population size =1672

e is the level of precision =0.05

$$n=\frac{1672}{1+1672(0.05)2}$$

n=323

3.6 Sampling Procedure

The research used simple random sampling. Simple random sampling ensures equal probability of selection of study objects being chosen for representative learning and replication of lessons and strategies to help industries as gained from samples (Kothari, 2008). Simple random sampling was used to select logistic companies in Nairobi County. In this method a list of all logistic companies was obtained from register of companies. The names of logistic companies were written to give every company a chance to participate in the study, simple random sampling procedure without replacement were used to sample 323 companies. According to Meng (2013) simple random sampling is used on those occasions when processing the entire dataset is not necessary and is considered too expensive in terms of response time or resource usage. The savings generated by sampling may be due to reductions in the cost. This sampling technique were used in order to avoid biasness because all the respondents have required information.

3.6.1 Data Types, Sources and Collection Instruments

This study used primary sources of data to produce quantitative information. A primary source gives the researcher a direct evidence about the effect of e-logistic on supply chain performance of logistic companies. Since primary sources provide raw information and first-hand evidence (Sobolewski, Long & Ashmore, 2019). The data were collected from operational managers of logistic companies using questionnaires. The development of questionnaire in this study was divided into a number of steps and guided by the objectives of the study.

3.6.2 Data Collection Procures

Upon getting the consent of the University, the researcher proceeded to getting permission from the county government offices. On the set date, questionnaires were

administered directly to the respondent using drop and pick method and a follow up were conducted by the researcher to ensure the questionnaires are filled in accordance with the research. The respondents were given researchable time to complete the copies of the questionnaire before picking them for analysis. The questionnaire comprised of open-ended questions. This allowed the respondents to give their own views. The researcher prepared and an introductory letter to the respondents.

3.7 Measurement of Variables

There are several methods of collecting primary data in the field of research. The tool used were questionnaires which were administered to employees of the logistic companies due to the merits and demerits outlined in the matrix Table 3.1. The construction of the questionnaire started with an introductory request followed by items which are subdivided into three parts. Part 1 is set to capture personal information of the respondents such as gender, age, education level and how many times he/she have been in employed at logistic company; part 2 is set to capture items on specific objectives; effect of E- tendering, automated warehousing operations systems, electronic order processing and enterprise resource planning on supply chain performance. Part 3 is set to capture items on supply chain performance. The questionnaires were constructed using Likert type with a scale of 1 to 5. The highest degree was marched with the most positive choice from the alternatives while the least score was awarded to the most negative choice. Likert scale for which 5-Strongly Agree, 4-Agree, 3-Undecided, 2-Disagree and 1-Strongly Disagree. This is tabulated as per the objectives under the methods of data collection below.

Table 3.1 Measurement of Variables

Type	Variable	Measurement scale	Sources
Dependent Variable	Supply Chain Performance - Dependent Variable	5-point linkert scale	Arshad & Gondal (2013), Hill & Brierley (2017).
Independent Variable	E- tendering	5-point linkert scale	Farahani, Miandoabchi, Szeto & Rashidi, (2013).
Independent Variable	Automated warehousing operations systems	5-point linkert scale	Staudt, Alpan, Mascolo & Rodriguez, (2015)
Independent Variable	Electronic order Processing	5-point linkert scale	Christopher (2010) Bowersox, *et al*., (2010) Stevenson, 2009
Independent Variable	Enterprise resource planning	5-point linkert scale	Leon, A. (2014).

Source: Researcher, (2019)

3.8 Pilot Study

The piloting of the questionnaires was conducted before main study. In order to ascertain validity and reliability of the research instruments, the researcher piloted the instruments by distributing 32 questionnaires to respondents at logistic companies in Uasin Gishu County. The pilot respondents represented 10% of the sample size (Doody & Doody, 2015). The results of the piloted questionnaires enabled the researcher to determine the consistency of responses to be made by respondents and adjust the items accordingly by revising the research instrument. The choice of Uasin Gishu County for piloting was due logistic companies having similar characteristics as those in Nairobi county.

3.8.1 Reliability of Research Instruments

Reliability is the consistency of measurement, or the degree to which an instrument measures the same way each time it is used under the same condition with the same subjects (Cronbach, 1951). The researcher used internal consistency measure known as Cronbach's alpha (α). It indicates the extent to which a set of test items can be treated as measuring a single latent variable. The recommended value of 0.7 were used as a cut-off of reliabilities. Cronbach's alpha is a general form of the Kunder-Richardson (K-R) 20 formulas used to access internal consistency of an instrument based on split-half reliabilities of data from all possible halves of the instrument.

3.8.2 Validity of Research Instruments

The study employed the use of a content validity measure, which is usually subjective, thorough and representative of the wider body of material that the research is trying to assess. Research instruments were availed to the supervisors and other specialized lecturers for validation before carrying out the field study for real data collection. According to May (2011) the researcher needs to seek the opinion of individuals who can render intelligent judgment about their adequacy.

In order to determine content validity for quantitative data, the researcher obtained the ration of the number of items rated as relevant per objective to that of the total number of items in the questionnaire. When converted into percentage, a value greater than 50% validates the instrument (Creswell & Creswell, 2017). Prior to using the questionnaire for data collection, the researcher discussed them with the supervisors and colleagues. The respondents' opinions during pilot study were used to improve the research instrument for the final study.

In addition, Kaiser-Mayor-Oklin measures of sampling adequacy (KMO) and Bartlett's test of sphericity were applied to test whether a relation between the study variables exist. Kaiser- Mayor- Oklin was used as a measure of sampling adequacy and a value of >.5 and p-value <0.5 was acceptable. Factor analysis was employed in this regard to help in identifying the actual number of factors that actually measured each construct as perceived by the respondents. The validity of the instrument was measured through Bartlett's Test of Sphericity (Alrumman, 2016). The Bartlett's test of sphericity was used as a test of the adequacy of the correlation matrix whereby it tests the null hypothesis that the correlation matrix has all diagonal elements as 1 and non-diagonal elements as 0. If the test value is large and the significance level is small, then the null hypothesis that the variables are independent can be rejected.

3.9 Data Processing, Analysis and Presentation

After data collection data processing, analysis and data presentation was done.

3.9.1 Data Processing

This involved a series of actions performed on the data in terms of sorting, checking and editing for completeness and consistency. Data collected were coded, edited and analyzed through the Statistical Package for Social Science (SPSS) software.

3.9.2 Data Analysis

Data analysis is the actions and methods performed on data that helped the researcher to describe facts, detect patterns, develop explanations and test hypotheses. Quantitative data collected were analyzed by use of descriptive and inferential statistics. Descriptive statistics were frequency, percentages, means, and standard deviations while inferential statistics were correlation and multiple regressions. Frequency tables, charts and graphs were used to present the data collected for ease of

understanding and analysis. Data analysis was done with aid of Statistical Package for Social Scientists (SPSS). The following regression model were used:

$$\mathbf{Y= \beta_0+\beta_1 x_1+\beta_2 x_2+\beta_3 x_3 + \beta_4 x_4+\varepsilon}$$

Where: Y represents on supply chain performance

$\boldsymbol{\beta_0}$ represent the intercept when x is zero

$\mathbf{X_1}$ represent E- tendering

$\mathbf{X_2}$ represent automated warehousing operations systems

$\mathbf{X_3}$ represent electronic order processing

$\mathbf{X_4}$ Enterprise resource planning

$\boldsymbol{\beta_1, \beta_2, \beta_3}$ and $\boldsymbol{\beta_4}$ and coefficients of the study variables

$\boldsymbol{\varepsilon}$ represents error term.

3.10 Assumptions of Regression model

The study tested for linearity, independence of errors, collinearity and normality

3.10.1 Linearity Assumption

Linearity defines the dependent variable as a linear function of the predictor (independent) variables (Darlington, 1968). Multiple regressions can accurately estimate the relationship between dependent and independent variables when the relationship is linear in nature (Osborne & Waters, 2002). The chance of on-linear relationships is high in the social sciences; therefore, it is essential to examine analyses for linearity (Osborne & Waters, 2002). Linearity assumption accurately estimates the relationship between dependent and independent variables; it tests if the relationships are linear in nature. Non linearity of the regression analysis under-estimate the true relationship between the study variables, this was done by use of the Pearson product moment Correlation. Saunders (2009) indicated that a correlation of 1 shows a Perfect

linear correlation, correlation of between 0.9 and 1 indicates Positive strong correlation, correlation between 0.7 and 0.9 Positive high correlation, correlation of between 0.5 and 0.7 indicates a Positive moderate correlation, correlation of 0 and 0.5 Weak correlation while a correlation of 0 indicates No relationship and a correlation of -1 and 0 indicates a negative relationship.

3.10.2 Autocorrelation Assumption

Autocorrelation refers to the assumption that errors are independent of one another, implying that subjects are responding independently. The goal of research is often to accurately model the 'real' relationships in the population (Osborne & Waters, 2002). In educational and social science research it is often difficult to measure variables, which makes measurement error an area of particular concern (Osborne & Waters, 2002). To diagnose violations of this assumption is through Durbin-Watson Statistic test. The Durbin-Watson statistic is typically used to test: H0: $\rho = 0$ vs. H1: $\rho > 0$ since when error terms are correlated in business and economic applications, the correlation tends to be positive. The statistic D ranges in value from zero to four. When the error terms are independent, we expect D to be close to 2. "Small" values of D suggest that error terms tend to cluster (positive autocorrelation); "large" values of D suggest that error terms tend to alternate (+, -, +, -) (negative autocorrelation).

3.10.3 Multicollinearity Assumption

Collinearity (also called multicollinearity) refers to the assumption that the independent variables are uncorrelated (Darlington, 1968). The researcher is able to interpret regression coefficients as the effects of the independent variables on the dependent variables when collinearity is low (Poole & O'Farrell, 1971). This means that we can make inferences about the caused and effects of variables reliably. Multicollinearity occurs when several independent variables correlate at high levels

with one another, or when one independent variable is a near linear combination of other independent variables. The more variables overlap (correlate) the less able researchers can separate the effects of variables. In MR the independent variables are allowed to be correlated to some degree (Cohen, 1968). The regression is designed to allow for this, and provides the proportions of the overlapping variance (Cohen, 1968). Ideally, independent variables are more highly correlated with the dependent variables than with other independent variables. To diagnose multicollinearity the study used variance inflation factors (VIF) and tolerance. A VIF greater than 10 or tolerance below 0.10 imply serious multicollinearity problem.

3.10.4 Normality Assumption

Multiple regressions assume that variables have normal distributions (Darlington, 1968; Osborne & Waters, 2002). This means that errors are normally distributed, and that a plot of the values of the residuals will approximate a normal curve (Gelman & Hill, 2006). The assumption is based on the shape of normal distribution and gives the researcher knowledge about what values to expect (Gelman & Hill, 2006). Once the sampling distribution of the mean is known, it is possible to make predictions for a new sample (Gelman & Hill, 2006). To test the assumption of normality, the following measures and tests can be applied: To test the assumption of normal distribution Kolmogorov-Smirnov and Shapiro-Wilk was used. The value less than 0.035 Kolmogorov-Smirnov is not normal while also value for Shapiro-Wilk less than 0.05 indicate non-normality.

3.11 Ethical Considerations

The researcher obtained an introductory letter from Moi University that was presented to the National Commission for Science Technology and Innovation (NACOSTI). Confidentiality of participants in the study was strictly adhered to at all times

throughout the course of, and following the study and publication of the results. The researcher used an informed consent sheet which contained phrases indicating that the study participation is voluntary, the objectives of the study, the study procedures, the selection criteria, the anticipated benefits of their involvement, any risk, assurance of the confidentiality aspect, and privacy during interview. After the participants have read and comprehended the informed consent, the participants are requested to indicate their voluntary participation by signing the informed consent sheet.

CHAPTER FOUR

DATA ANALYSIS, FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter presents the results of the data that was collected from the study, analyzed and presented. The overall objective of the study was to assess the effect of electronic – logistics practices on supply chain performance of logistic companies in Nairobi, Kenya. The chapter contains the study response rate, pilot study results, descriptive analysis, and inferential analysis, correlation and regression analysis.

4.2 Response Rate

The population of the study consisted of logistic companies in Nairobi County. The results of response rate are presented in Table 4.1.

Table 4.1: Response Rate

Response Rate	Frequency	Percentage
Responded	251	77.7
Not responded	72	22.3
Total	**323**	**100**

The response rate results in Table 4.1 revealed that 323 questionnaires were issued to the respondents however, 251 questionnaires were dully filled and returned. This translates to 77.7% as shown in Table 4.1. This response rate is considered very good to enable the determination of the phenomenon that exist as it is in line with Mugenda and Mugenda (2008) assertion. They state that a response rate of above 75% is recommended for the generalization of the study findings.

4.3 General Information of the Respondents

This section presents the bio data information of the respondents in relation to the study namely; period of service and educational background.

4.3.1 Period of Service

This section aims at determining the period of service in the logistics companies in Nairobi. The results are as shown in Table 4.2. The findings indicate that majority 148(58.9%) of the respondents had worked for 5-10 years, 62(24.7%) had worked for 11-20 years while the least 41(16.3%) had worked for less than 5 years. This shows that majority of the respondents had been working in the firms for a longer period (more than 5 years) hence were well informed on the available practices and performance of firms.

Table 4.2 Period of Service

Period of Service	Frequency	Percentage
Less than 5 years	41	16.3
5-10 years	148	58.9
11-20 years	62	24.7
Total	**251**	**100**

4.3.2 Educational Level

This section aims at determining the academic background which was obtained through assessing their highest level of education. These results are presented in Table 4.3. The study findings show that majority of the respondents at 120(47.8%) had undergraduate degrees, 84(33.5%) had post graduate degrees and 47(18.7%) had diploma. This therefore shows that the respondents were well qualified for their respective positions.

Table 4.3 Educational Level

Educational Level	Frequency	Percentage
College diploma	47	18.7
Bachelor's degree	120	47.8
Master's degree	84	33.5
Total	**251**	**100**

4.4 Descriptive Statistics

This section represents the descriptive statistics in relation to the study namely; E-tendering, automated warehousing operations systems, electronic order processing systems and the dependent variable supply chain performance. To achieve this, a five-point likert scale was used where; 1=Strongly Disagree, 2=Disagree, 3=Undecided.4=Agree, 5=Strongly Agree.

4.4.1 E- Tendering

The study sought to determine the effect of E-tendering on supply chain performance of logistic companies in Nairobi. Table 4.4 presents the study results. The study results on the effect of E-tendering on supply chain performance of logistic companies in Nairobi shows that 82(32.7%) strongly agree of the respondents, 132(52.6%) agree, 8(3.2%) undecided, 17(6.8%) disagree and 12(4.8%) strongly disagree with the statement that E- tendering has enable the logistic companies to **r**educes the time for tender processing (Mean=4.016, standard deviation=1,031). Also, 69(27.5%) strongly agree of the respondents, 143(56.9%) agree, 10(3.9%) undecided, 16(6.4%) disagree and 13(5.2%) strongly disagree with the statement that through e tendering suppliers are able to access tenders/quotation/requests any time anywhere in the world (Mean=3.952, standard deviation=1,019).

Further, 68(27.1%) strongly agree, 142(56.6%) agree, 13(5.2%) undecided, 18(7.2%) disagree and 10(3.9%) strongly disagree with the statement that with adoption of e-

tendering there is no alteration of tender documents is impossible or easy to detect (Mean=3.956, standard deviation=1.019). Finally, 71(28.3%) strongly agree, 139(55.4%) agree, 17(6.8%) undecided, 10(3.9%) disagree and 14(5.6%) strongly disagree with the statement that adoption of e tendering has help in eliminating noncompliant bids automatically (Mean=3.968, standard deviation=1.007). The study results also revealed that E-tendering has a positive effect on supply chain performance of logistic companies in Nairobi. This implies that E- tendering has enabled the logistic companies reduce the time for tender processing. It has enabled the suppliers to access tenders/quotation/requests any time anywhere in the world. Finally, e tendering has helped in eliminating noncompliant bids automatically.

Table 4.4 E- Tendering

Statements		**SA**	**A**	**N**	**D**	**SD**	**Mean**	**Std.Dev**
1. E- tendering has enable the logistic companies to reduces the time for tender processing	F	82	132	8	17	12	4.016	1.031
	%	32.7	52.6	3.2	6.8	4.8		
2. Through e tendering suppliers are able to access tenders/quotation/requests any time anywhere in the world	F	69	143	10	16	13	3.952	1.019
	%	27.5	56.9	3.9	6.4	5.2		
3. With adoption of e-tendering there is no alteration of tender documents is impossible or easy to detect.	F	68	142	13	18	10	3.956	1.019
	%	27.1	56.6	5.2	7.2	3.9		
4. Adoption of e tendering has help in eliminating noncompliant bids automatically	F	71	139	17	10	14	3.968	1.007
	%	28.3	55.4	6.8	3.9	5.6		
Valid N	**251**						**3.973**	

4.4.2 Automated Warehousing Operations Systems

The study sought to determine the effect of automated warehousing operations systems on supply chain performance of logistic companies in Nairobi. Table 4.5 presents

the study results. The study results on the effect of automated warehousing operations systems on supply chain performance of logistic companies in Nairobi shows that 62(24.7%) strongly agree of the respondents, 161(64.1%) agree, 9(3.6%) undecided, 10(3.9%) disagree and 9(3.6%) strongly disagree with the statement that data capture systems enhances the warehousing operations on organizational performance of logistic companies (Mean=4.023, Standard deviation=0.8760). Further, 65(25.9%) strongly agree of the respondents, 154(61.4%) agree, 11(4.4%) undecided, 11(4.4%) disagree and 10(3.9%) strongly disagree with the statement that automation of storage information enhances the warehousing operations on organizational performance of logistic companies (Mean=4.008, Standard deviation=.9165).

Also, 62(24.7%) strongly agree of the respondents, 162(64.5%) agree, 8(3.2%) undecided, 7(2.8%) disagree and 12(4.8%) strongly disagree with the statement that retrieval of warehouse information enhances logistic management and performance of organization (Mean=4.016, Standard deviation=0.9076). Finally, 59(23.5%) strongly agree of the respondents, 169(67.3%) agree, 4(1.6%) undecided, 7(2.8%) disagree and 12(4.8%) strongly disagree with the statement that automation in warehousing has enhanced Accuracy and efficiency of logistic companies (Mean=4.019, Standard deviation=0.8919). The study findings also indicated that automated warehousing operations systems on supply chain performance of logistic companies in Nairobi. This implies that data capture systems, automation of storage information, retrieval of warehouse information and automation in warehousing has enhanced Accuracy and efficiency of logistic companies.

Table 4.5 Automated Warehousing Operations Systems

Statements		SA	A	UD	D	SD	Mean	Std. D
1. Data capture systems enhances the warehousing operations on organizational performance of logistic companies	F	62	161	9	10	9	4.023	.8760
	%	24.7	64.1	3.6	3.9	3.6		
2. Automation of storage information enhances the warehousing operations on organizational performance of logistic companies	F	65	154	11	11	10	4.008	.9165
	%	25.9	61.4	4.4	4.4	3.9		
3. Retrieval of warehouse information enhances logistic management and performance of organization	F	62	162	8	7	12	4.016	.9076
	%	24.7	64.5	3.2	2.8	4.8		
4. Automation in warehousing has enhanced Accuracy and efficiency of logistic companies	F	59	169	4	7	12	4.019	0.8919
	%	23.5	67.3	1.6	2.8	4.8		
Valid N	251						**4.017**	

4.4.3 Electronic Order Processing

The study sought to determine the effect of electronic order processing on supply chain performance of logistic companies in Nairobi. Table 4.6 presents the study results. The study results on the effect of electronic order processing on supply chain performance of logistic companies in Nairobi shows that 43(17.1%) strongly agree of the respondents, 185(73.7%) agree, 14(5.6%) undecided, 5(1.9%) disagree and 4(1.6%) strongly disagree with the statement that Electronic order has enhanced capturing and administering data electronically enhance reducing paper work and time waste (mean=4.028, standard deviation=0.449).

Also, 43(17.1%) strongly agree of the respondents, 191(76.1%) agree, 5(1.9%) undecided, 6(2.4%) disagree and 6(2.4%) strongly disagree with the statement that electronic ordering has made tracking shipping goods and product easy hence giving

clients confident on logistic companies (mean=4.032, standard deviation=0.5009). Further, 42(16.7%) strongly agree of the respondents, 178(70.9%) agree, 16(6.4%) undecided, 7(2.8%) disagree and 8(3.2%) strongly disagree with the statement that Dissemination of logistic information to customers through electronic order enhances the performance of logistic companies (mean=3.952, standard deviation=0.627). Finally, 45(17.9%) strongly agree of the respondents, 180(71.7%) agree, 9(3.6%) undecided, 9(3.6%) disagree and 8(3.2%) strongly disagree with the statement that Validation of logistic information's enhanced its performance (mean=3.976, standard deviation=0.6448).

The study also revealed that electronic order processing has a positive influence on supply chain performance of logistic companies in Nairobi. This implies that Electronic order has enhanced capturing and administering data electronically enhance reducing paper work and time waste and has made tracking shipping goods and product easy hence giving clients confident on logistic companies. Dissemination of logistic information to customers through electronic order enhances the performance of logistic companies. Validation of logistic information's enhanced its performance.

Table 4.6 Electronic Order Processing

Statements		SA	A	UD	D	SD	Mean	Std.Dev
1. Electronic order has enhanced capturing and administering data electronically enhance reducing paper work and time waste	F	43	185	14	5	4	4.028	0.449
	%	17.1	73.7	5.6	1.9	1.6		
2. Electronic ordering has made tracking shipping goods and product easy hence giving clients confident on logistic companies	F	43	191	5	6	6	4.032	0.501
	%	17.1	76.1	1.9	2.4	2.4		
3. Dissemination of logistic information to customers through electronic order enhances the performance of logistic companies	F	42	178	16	7	8	3.952	0.627
	%	16.7	70.9	6.4	2.8	3.2		
4. Validation of logistic information's enhanced its performance	F	45	180	9	9	8	3.976	0.645
	%	17.9	71.7	3.6	3.6	3.2		
Valid	**251**						**3.997**	

4.4.4 Enterprise Resource Planning

The study sought to determine the effect of enterprise resource planning on supply chain performance of logistic companies in Nairobi. Table 4.7 presents the study results. The study results on the effect of enterprise resource planning on supply chain performance of logistic companies in Nairobi shows that 26(10.4%) strongly agree of the respondents, 197(78.5%) agree, 15(6.0%) undecided, 8(3.2%) disagree and 5(1.9%) strongly disagree with the statement that Budgeting systems has help organization to improve their budgeting in supply chain performance (mean=3.92, standard deviation=0.6823). Also, 27(10.8%) strongly agree of the respondents, 181(72.1%) agree, 9(3.6%) undecided, 21(8.4%) disagree and 13(5.2%) strongly disagree with the statement that enterprise resource planning has help in product

tracking and improve supply chain performance (mean=3.75, standard deviation=0.940).

Further, 22(8.8%) strongly agree of the respondents, 207(82.5%) agree, 5(1.9%) undecided, 8(3.2%) disagree and 9(3.6%) strongly disagree with the statement that Distribution requirement planning applied in the company has enhance supply chain performance (mean=3.90, standard deviation=0.741). Finally, 29(11.6%) strongly agree of the respondents, 196(78.1%) agree, 5(1.9%) undecided, 9(3.6%) disagree and 12(4.8%) strongly disagree with the statement that Demand planning system applied in the company has enhance supply chain performance (mean=3.88, standard deviation=0.835)

The study also revealed that enterprise resource planning has a positive influence on supply chain performance of logistic companies in Nairobi. This implies that budgeting systems helps organization to improve their budgeting in supply chain performance. It also helps in product tracking and improves supply chain performance. Further, distribution requirement planning applied in the company has enhanced supply chain performance. Finally, demand planning system applied in the company has enhanced supply chain performance.

Table 4.7 Enterprise Resource Planning

Statements		SA	A	UD	D	SD	Mean	Std. Dev
1. Budgeting systems has help organization to improve their budgeting in supply chain performance	F	26	197	15	8	5	3.92	0.6823
	%	10.4	78.5	6.0	3.2	1.9		
2. Enterprise resource planning has help in product tracking and improve supply chain performance	F	27	181	9	21	13	3.75	0.940
	%	10.8	72.1	3.6	8.4	5.2		
3. Distribution requirement planning applied in the company has enhance supply chain performance	F	22	207	5	8	9	3.90	0.741
	%	8.8	82.5	1.9	3.2	3.6		
4. Demand planning system applied in the company has enhance supply chain performance	F	29	196	5	9	12	3.88	0.835
	%	11.6	78.1	1.9	3.6	4.8		
Valid		**251**					**3.862**	

4.4.5 Supply Chain Performance

The study finally sought to assess the effect of electronic – logistics practices on supply chain performance of logistic companies in Nairobi, Kenya. Table 4.8 presents the study results. The study results on the effect of electronic-logistics on supply chain performance of logistic companies in Nairobi shows that 61(24.3%) strongly agree of the respondents, 170(67.7%) agree, 6(2.4%) undecided, 8(3.2%) disagree and 6(2.4%) strongly disagree with the statement that automated warehousing operations systems has made warehouse operation efficient and accurate information's concern icing storage hence customers are satisfied (Mean=4.084, standard deviation=0.778). Further, 58(23.1%) strongly agree of the respondents, 161(64.1%) agree, 11(4.4%) undecided, 7(2.8%) disagree and 14(3.6%) strongly disagree with the

statement that Electronic ordering system has enhanced customers satisfaction because they can track their goods on transit (Mean=3.964, standard deviation=0.944).

Also, 58(23.1%) strongly agree of the respondents, 171(68.1%) agree, 7(2.8%) undecided, 7(2.8%) disagree and 8(3.2%) strongly disagree with the statement that Electronic order processing has ensured logistic companies to have a wide market share (Mean=, standard deviation=). Finally, 65(25.8%) strongly agree of the respondents, 166(66.1%) agree, 5(1.9%) undecided, 3(1.2%) disagree and 12(4.8%) strongly disagree with the statement that logistic companies in have ensure they cover a wide area in their operations with safety (Mean=4.072, standard deviation=0.869). The study findings show that there is a positive influence of electronic – logistics practices on supply chain performance of logistic companies in Nairobi, Kenya.

Table 4.8 Supply Chain Performance

Statements		**SA**	**A**	**UD**	**D**	**SD**	**Mean**	**Sd**
1. Automated warehousing operations systems has made warehouse operation efficient	F	61	170	6	8	6	4.084	0.778
	%	24.3	67.7	2.4	3.2	2.4		
2. Automated warehousing operations systems has made warehouse operation efficient and accurate information's concern icing storage hence customers are satisfied	F	58	161	11	7	14	3.964	0.944
	%	23.1	64.1	4.4	2.8	5.6		
3. Electronic order processing has ensured logistic companies to have a wide market share	F	58	171	7	7	8	4.052	0.811
	%	23.1	68.1	2.8	2.8	3.2		
4. Logistic companies in have ensure they cover a wide area in their operations with safety	F	65	166	5	3	12	4.072	0.869
	%	25.9	66.1	1.9	1.2	4.8		
Valid	**251**						**4.043**	

4.5 Reliability and Validity Result

The study presented the results of reliability and validity result as follows. The reliability results from the pilot study are presented in Table 4.9.

Table 4.9 Reliability Test Results

Constructs	Test Items	Cronbach's Alpha
E- tendering	4	.8046
Automated warehousing operations systems	4	.8197
Electronic order processing	4	.8450
Enterprise Resource Planning	4	.7087
Supply chain performance	4	.8059
Average		**.8188**

As shown in Table 4.9, E- tendering had a Cronbach's alpha of 0.8046, automated warehousing operations systems had a Cronbach's of 0.8197, electronic order processing had Cronbach's of .8450 and supply chain performance had a Cronbach's of 0.8059. This thus shows that all the variables had a Cronbach alpha greater than 0.7 and hence the research instrument was reliable.

4.6 Factor Analysis

Twenty items which were initially identified to measure all the constructs were factor analyzed using principal component analysis using varimax rotation method. Results in table 4.10 shows a Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy as 0.748, with Bartlett's Test of Sphericity showing a significant Chi-Square (χ^2) of 1829.334, df = 190, p = 0.000. The KMO of .748, with a significant Chi-square indicates that the data was adequate to carry out a factor analysis. The table further indicates the factor loadings. Results show how all the twenty items were clustered into four (4) components.

Results show that component one (1) had an eigenvalue of 3.357 explaining variance of 16.78%. This variable was named electronic order processing after all its four items loaded on it as indicated in table 4.10. The second component in table 4.10 indicated eigenvalue of 3.164, with a percentage variance of 15.80%. This component was named supply chain performance after all its four items loaded on it as shown in table 4.10. Furthermore, findings indicated that all the four items measuring automated warehousing operations loaded on component three (Table 4.10). This component showed eigenvalues of 2.533 with a percentage variance of 12.67% being accounted for by the 4 items (table 4.10). Findings further reveal that four items measuring E-tendering loaded on component four (table 4.10). Findings show that this factor had an eigen value of 1.955 with a total variance of 9.78 (table 4.10). Finally, all items measuring Enterprise resource planning loaded on component five (table 4.10) with eigenvalues of 1.836 with a total of 9.19% of variance (table 4.10). The study findings indicate that more than 64% of total variance is explained by the four components in the study (table 4.10).

Table 4.10 Kaiser-Meyer-Olkin and Variance Results

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.			0.748
Bartlett's Test of Sphericity	Chi-Square		1829.33
	df		190
	Significance		0.000
Items of factors extracted		Eigen Values	% Variance	Total %
Component 1		3.357	16.783	16.783
Component 2		3.164	15.82	32.603
Component 3		2.533	12.666	45.269
Component 4		1.955	9.777	55.047
Component 5		1.837	9.186	64.232

Source: Research Data (2019)

Table 4.11 Factor Loadings

Items and their Factor Loadings	1	2	3	4	5
E- tendering has enable the logistic companies to reduce the time				0.756	
Through e tendering suppliers can access tenders/quotation/requests any time				0.804	
With adoption of e-tendering there is no alteration of tender documents				0.833	
Adoption of e tendering has help in eliminating noncompliant bids				0.760	
Data capture systems enhances the warehousing operations			0.779		
Automation of storage information enhances the warehousing operations			0.799		
Retrieval of warehouse information enhances logistic management			0.829		
Automation in warehousing has enhanced Accuracy and efficiency			0.767		
Electronic order has enhanced capturing and administering data electronically	0.840				
Electronic ordering has made tracking shipping goods and product easy	0.848				
Dissemination of logistic information to customers through electronic order	0.836				
Validation of logistic information's enhanced its performance	0.771				
Budgeting systems has help organization to improve their budgeting					0.769
Enterprise resource planning has help in product tracking					0.664
Distribution requirement planning applied in the company					0.780
Demand planning system applied in the company					0.710
Automated warehousing operations systems has made warehouse operation efficient		0.634			
Electronic ordering system has enhanced customers satisfaction		0.870			
Electronic order processing has ensured logistic companies to have a wide market		0.833			
logistic companies in have ensure they cover a wide area in their operations with safety		0.788			

4.7 Multiple Regression Model Assumption

The study tested normality, linearity, multicollinearity and independence of residuals assumptions.

4.7.1 Normality Assumption Test

In testing for normality of data histogram was used. Figure 4.1 shows the results of normality test.

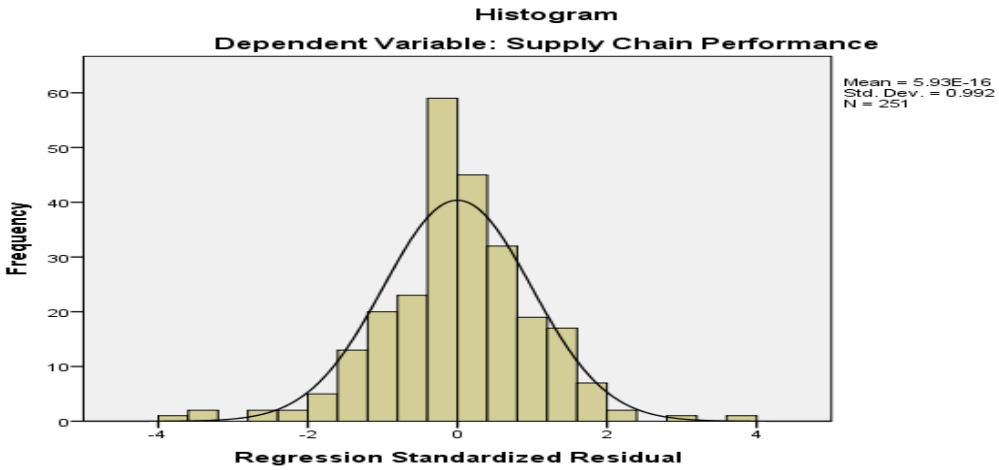

Figure 4.1 Histogram

Figure 4.1 showed that histogram bell curve shaped. The histogram shows prominent 'mound' in the center and similar tapering to the left -4 and right +4. This implies that data were normally distributed.

4.7.2 Test for Linearity

Linearity assumption was tested using Pearson correlation. From the results, correlations among the dimensions were all significant. Correlations between E-tendering, r=.650, Automated warehousing, r=.425, Electronic order process, r=.650 and Enterprise resource planning, r=.511 were positively and significantly related to supply chain performance, where they were all between a correlation of 0.3 and 0.7. Linearity assumption was therefore satisfied. This implies that all the dimensions of electronic – logistics practices under study jointly have a positive and significant effect

on supply chain performance. This gave an implication that the data used were linear. The results are shown in Table 4.12 below.

Table 4.12: Linearity Assumption

Electronic – logistics practices /supply chain performance	**Pearson Correlation**	**Sig. (2-tailed)**
E- tendering	.650**	0.000
Automated warehousing	.425**	0.000
Electronic order process	.650*	0.000
Enterprise resource planning	.511*	0.000

4.7.3 Multicollinearity Test Assumption

Multicollinearity was assessed using the tolerance and variance inflation factors (VIF). According to Field (2009) VIF values in excess of 10 is an indication of the presence of Multicollinearity.

The results in Table 4.13 present variance inflation factor values and tolerance value for E- tendering (tolerance=0. 578 and VIF=1.729), for automated warehousing operations systems (tolerance=0.779 and VIF=1.284), for electronic order processing (tolerance=0. 540 and VIF=1.852) and for enterprise resource planning (tolerance=0. 737 and VIF=1.356). The study results imply that all tolerance values for the four variables under study were all above 0.10 and VIF values all less than 10 which were accordance to Field, (2009). This gives an implication that data used had no multicollinearity.

Table 4.13 Multicollinearity Test Assumption

Variables	Tolerance	VIF
E- tendering	.578	1.729
Automated warehousing operations systems	.779	1.284
Electronic order process	.540	1.852
Enterprise resource planning	.737	1.356

4.7.4 Test for Autocorrelation

To establish whether or not the residual is serially correlated, Durbin-Watson test for autocorrelation was conducted. The Durbin Watson test reports a test statistic, with a value from 0 to 4, where: 2 denotes no autocorrelation; 0 to 2<2 denotes a positive autocorrelation; while >2 denotes a negative autocorrelation. The decision rule is that test statistic values in the range of 1.5 to 2.5 are relatively normal. Values outside this range could be cause for concern (Field, 2009). The results are as indicated in Table 4.14 below and therefore the null hypothesis of no autocorrelation is accepted and that residuals are not auto correlated (Durbin- Watson statistic value=2.020).

Table 4.14 Autocorrelation Test

R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
.750[a]	.562	.555	.667	2.02

4.8 Inferential Statistics

This section consists of correlation and regression analysis. The section was meant to achieve both general and specific objectives in establishing the relationships that exists between the study variables.

4.8.1 Correlation Analysis

Correlation analysis was done to achieve the study specific objectives. The findings are presented in Table 4.15.

Correlation refers to the strength of an association between two variables. A strong or high correlation means that two or more variables have a strong relationship with each other while a weak or low, correlation means that the variables are hardly related. Correlation coefficient can range from -1.00 to +1.00. The value of -1.00 represents a perfect negative correlation while a value of +1.00 represents a perfect positive correlation. A value of 0.00 means that there is no relationship between variables being tested (Orodho, 2003).

The findings revealed that E- tendering was strongly positively and statistically significant correlated to supply chain performance ($r=0.650$ $p<0.01$). Further, automated warehousing operations systems was strongly positively and statistically significant correlated to supply chain performance ($r=0.425$ $p<0.01$). Electronic order process was strongly positively and statistically significant correlated to supply chain performance ($r=0.650$ $p<0.01$). Finally, enterprise resource planning was strongly positively and statistically significant correlated to supply chain performance ($r=0.511$ $p<0.01$). This gave an implication that all the study variables were positively correlated to supply chain performance. E- tendering contributes 65% to supply chain performance. Automated warehousing operations systems contribute 42.5% to supply chain performance. Electronic order process contributes 65% to supply chain performance. Enterprise resource planning contributes 51% to supply chain performance.

Table 4.15 Correlations Analysis Results

Variables	1	2	3	4	5
Supply chain performance of logistic	1				
E- tendering	.650**	1			
Automated warehousing operations systems	.425**	.395**	1		
Electronic order processing	.650**	.608**	.442**	1	
Enterprise resource planning	.511**	.448**	.233**	.469**	1

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

4.8.2 Multiple Regression Analysis

Regression analysis is a statistical tool for the investigation of the relationship between variables. Usually, researcher seeks to maintain the causal effect of one variable upon another. Regression analysis allows you to model, examine and explore spatial relationship, and can help explain the factors behind observed spatial patterns. Regression analysis is also used for prediction.

4.8.3 Model Summary

Model summary provides the coefficient of determination (R^2) which shows proportion of the variance in the dependent variable that is predictable from the independent variable and correlation coefficient (R) shows the degree of association between the dependent and independent variables. The results presented in Table 4.16 present the fitness of model used of the regression model in explaining the study phenomena.

E- tendering, automated warehousing operating systems, electronic order processing and enterprise resource planning were found to be satisfactory variables in influencing

the supply chain performance. This is supported by coefficient of determination also known as the R square of 56.2%. This means that the independent variables explain 56.2% of the variations in the dependent variable (supply chain performance). The results further imply that the model applied to link the relationship of the variables was satisfactory.

Table 4.16 further provides the results on the analysis of the variance (ANOVA). The results indicate that the overall model was statistically significant as supported by a p value of 0.000 which is lesser than the critical p value of 0.05. Further, the results imply that the independent variables are good predictors of supply chain performance. This was supported by an F statistic of 78.999*** and the reported p value (0.000) which was less than the conventional probability of 0.05 significance level.

4.8.4 Regression Coefficient

Regression of coefficients results in Table 4.16 shows that E- tendering has a positive and significant influence on supply chain performance (β_1=0. 333, p=0. 000). It was further established that automated warehousing operations systems has a positive and significant influence on supply chain performance (β_2=0. 112, p=0. 019). Electronic order process was found to have a positive and significant influence on supply chain performance (β_3=0. 308, p=0.000). Finally, enterprise resource planning was found to have a positive and significant influence on supply chain performance (β_4=0. 191, p=0. 000). Therefore, the overall regression results imply that there is a positive and significant relationship between electronic – logistics practices on supply chain performance of logistic companies.

Table 4.16 Regression Analysis Coefficients

	Unstandardized Coefficients		**Standardized Coefficients**	**T**	**Sig.**
	B	**Std. Error**	**Beta**		
(Constant)	1.989E-15	.042		.000	1.000
E- tendering	.333	.055	.333	6.007	.000
Automated warehousing	.112	.048	.112	2.352	.019
Electronic order process	.308	.057	.308	5.372	.000
Enterprise resource planning	.191	.049	.191	3.879	.000
R^2	.562				
F-statistic	78.999***				

Where:

Y represents supply chain performance, dependent variable

X_1 represents E- tendering

X_2 represents automated warehousing operations systems

X_3 represents electronic order process

X_4 represents enterprise resource planning

4.9 Hypotheses Testing

From the regression model computed in Table 4.16, the research hypotheses were tested using the significance level of the coefficients. The research aimed to test the hypothesis with an aim of failing to reject or rejecting the relationship between independent and the dependent variables. The research hypothesis for the study included;

H_{01}: E- tendering has no significant effect on supply chain performance of logistic companies in Nairobi. The regression results in Table 4.16 indicate that there is

significant relationship between e-tendering and supply chain performance of logistic companies in Nairobi with a beta coefficient of 0. 333 and significance of (p= 0. 000). The study rejected the hypothesis. These results concur Malik (2013) who asserts that E-tendering to be affected, registration process, submission process and bid evaluation process are necessary. Bid evaluation process will be carried out at buyer end where the buyer will create the committee. This committee is responsible for bid opening. After analyzing the entire bid will be evaluated and comparative report will be generated and result will be shared and appropriate supplier will get the award of contract.

H_{02}: Automated warehousing operations systems have no significant effect on supply chain performance of logistic companies in Nairobi. The regression results in Table 4.16 indicate that there is significant relationship between Automated warehousing operations systems and supply chain performance of logistic companies in Nairobi with a beta coefficient of 0. 112 and significance of (p= 0. 019). The study rejected the hypothesis. These results concur Granlund and Wiktorsson (2014) who in their study noted that automation in internal logistics is an enabler to increase overall competitiveness in an organization.

H_{03}: Electronic order process has no significant effect on supply chain performance of logistic companies in Nairobi. The regression results in Table 4.16 indicate that there is significant relationship between Electronic order process and supply chain performance of logistic companies in Nairobi with a beta coefficient of 0. 308 and significance of (p= 0.000). The study rejected the hypothesis. These results concur Presutti (2003) who noted that some of the earliest e-procurement solutions focused on establishing ordering routines and reducing transaction costs associated with operating resource purchasing for typically maintenance, repair and operating (MRO)

supplies by automating the requisitioning to payment cycle which positively influenced performance.

H_{04}: Enterprise resource planning has no significant effect on supply chain performance of logistic companies in Nairobi. The regression results in Table 4.16 indicate that there is significant relationship between Enterprise resource planning and supply chain performance of logistic companies in Nairobi with a beta coefficient of 0. 191 and significance of (p= 0.000). The study rejected the hypothesis. These results concur Southard (2002) who concluded that by using customer demand in implementing procurement performance, a firm may help reduce firm costs in the whole supply chain.

Table 4.17 Summary of Hypotheses Test Results

No.	Hypotheses	β	P-value	Decision
H_{01}	E- Tendering has no significant effect on supply chain performance of logistic companies in Nairobi.	0.333	0.000	Rejected Null Hypothesis
H_{02}	Automated warehousing operations systems have no significant effect on supply chain performance of logistic companies in Nairobi.	0.112	0.019	Rejected Null Hypothesis
H_{03}	Electronic order process has no significant effect on supply chain performance of logistic companies in Nairobi.	0.308	0.000	Rejected Null Hypothesis
H_{04}	Enterprise resource planning has no significant effect on supply chain performance of logistic companies in Nairobi.	0.191	0.000	Rejected Null Hypothesis

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter summarizes the findings of the study reported in chapter four upon the data analysis. More specifically, the chapter covers summary of the findings, conclusion, recommendations and suggestions for further study.

5.2 Summary of the Study Findings

The study findings are summarized in the section below as per the study objectives.

5.2.1 E- Tendering

The first objective sought to determine the effect of E- tendering on supply chain performance of logistic companies in Nairobi. The study found out that the respondents agreed on all aspects of E- tendering. They agreed that E- tendering has enable the logistic companies to reduces the time for tender processing, through e tendering suppliers are able to access tenders/quotation/requests any time anywhere in the world, With adoption of e-tendering there is no alteration of tender documents is impossible or easy to detect, adoption of e tendering has help in eliminating noncompliant bids automatically.

The study findings also showed that E- tendering was statistically significant and has a positive influence on supply chain performance of logistic companies in Nairobi. The study findings also revealed that E- tendering has a positive effect on supply chain performance of logistic companies in Nairobi. This implies that E- tendering has enabled the logistic companies reduce the time for tender processing. It has enabled the suppliers to access tenders/quotation/requests any time anywhere in the world. Finally, e tendering has helped in eliminating noncompliant bids automatically.

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

The study findings further concurred with Osir (2016) who noted that E-tendering manages the tendering cycle from the advertisement of the notice straight through to the issuing of an award. Chen and Kitsis (2017) indicated that E-tendering provides a centralized process to help organizations improve efficiencies and accountability while reducing traditional tendering costs and increasing supply chain performance. Ibem and Laryea (2017) revealed that E-tendering enables firms to be more efficient in their supply chains as paper-based transactions are reduced or eliminated, facilitating for a speedier exchange of information thus high supply chain performance

5.2.2 Automated Warehousing Operations Systems

The second objective sought to determine the effect of automated warehousing operations systems on supply chain performance of logistic companies in Nairobi. The study found out that the respondents agreed on all aspects of E- tendering. They agreed that data capture systems enhance the warehousing operations on organizational performance of logistic companies, automation of storage information enhances the warehousing operations on organizational performance of logistic companies, retrieval of warehouse information enhances logistic management and

performance of organization and automation in warehousing has enhanced Accuracy and efficiency of logistic companies.

The study findings also showed that automated warehousing operations systems was statistically significant and has a positive influence on supply chain performance of logistic companies in Nairobi. The study findings also revealed that automated warehousing operations systems on supply chain performance of logistic companies in Nairobi. This implies that data capture systems, automation of storage information, retrieval of warehouse information and automation in warehousing has enhanced Accuracy and efficiency of logistic companies.

The study finding is in agreement with Laudon and Laudon (2016) who found that warehouse management system has a positive impact on companies' performance. The study results also concurs with Mukolwe and Wanyoike (2015) whose findings indicated that Automation of warehousing activities greatly enhances accuracy, speed of operations and reduces wastage. Transport management and physical distribution practices on the other hand allows faster and cost-effective flow of goods and raw materials thus improving operational efficiency.

The study findings concurred with Granlund and Wiktorsson (2014) who noted that automation in internal logistics is an enabler to increase overall competitiveness in an organization. The findings reveal a lack of responsibility for, and insight in current state of logistics operations as well as a lack of vision and strategy giving directions for desired future state of operations. Chang (2016) in addition, the actual automation projects are hindered by poorly defined and supported processes.

5.2.3 Electronic Order Processing

The third objective sought to determine the effect of electronic order processing on supply chain performance of logistic companies in Nairobi. The study found out that the respondents agreed on all aspects of electronic order processing. They agreed that Electronic order has enhanced capturing and administering data electronically enhance reducing paper work and time waste, electronic order has made tracking shipping goods and product easy hence giving clients confident on logistic companies, dissemination of logistic information to customers through electronic order enhances the performance of logistic companies and validation of logistic information's enhanced its performance.

The study findings also showed that electronic order processing was statistically significant and has a positive influence on supply chain performance of logistic companies in Nairobi. The study findings also revealed that Electronic order has enhanced capturing and administering data electronically enhance reducing paper work and time waste and has made tracking shipping goods and product easy hence giving clients confident on logistic companies. Dissemination of logistic information to customers through electronic order enhances the performance of logistic companies. Validation of logistic information's enhanced its performance.

The study results concede with Macharia *et al.* (2015) who examined the effects of information technology on Logistic firm's performance in Nairobi Kenya in order to realize its significant impact on their operations in order to guarantee their profitability and growth. The study also agrees with Presutti (2003) who noted that some of the earliest e-procurement solutions focused on establishing ordering routines and reducing transaction costs associated with operating resource purchasing for typically

maintenance, repair and operating (MRO) supplies by automating the requisitioning to payment cycle.

The study results further agreed with Christopher (2010) who revealed order processing is the term used to identify the collective tasks associated with fulfilling an order for goods or services placed by a customer and it formed the basis for the information flow in a logistics system. It had three principal functions that is create a flow of information that preceded the goods, accompanied them and followed them. The importance of accurate information to achieving superior logistical performance had historically been underappreciated. While many aspects of information were critical to logistics operations, the processing of orders was of primary importance (Bowersox, *et al*., 2010).

The study results further concurred with Macharia *et al.* (2015) realized that there is a significant impact of operations on profitability and growth of logistic companies. Bae (2016) examined the moderating effect of logistics information systems (LIS) on inter-organizational collaboration (IOC) and performance.

5.2.4 Enterprise Resource Planning

The last objective sought to determine the effect of enterprise resource planning on supply chain performance of logistic companies in Nairobi. The study found out that the respondents agreed on all aspects of enterprise resource planning. They agreed that Budgeting systems has help organization to improve their budgeting in supply chain performance, enterprise resource planning has help in product tracking and improve supply chain performance, distribution requirement planning applied in the company has enhance supply chain performance and demand planning system applied in the company has enhance supply chain performance.

The study findings also showed that enterprise resource planning was statistically significant and has a positive influence on supply chain performance of logistic companies in Nairobi. The study also revealed that enterprise resource planning has a positive influence on supply chain performance of logistic companies in Nairobi. This implies that budgeting systems helps organization to improve their budgeting in supply chain performance. It also helps in product tracking and improves supply chain performance. Further, distribution requirement planning applied in the company has enhanced supply chain performance. Finally, demand planning system applied in the company has enhanced supply chain performance.

The study findings further agreed with Sandy (2009) findings which indicated that most frequent information that are shared between supplier and firm are demand forecast, inventory level and supplier lead time. Procurement arrangement has the potential of generating significant benefit of reducing operation costs by sharing of information. Average improvement of information sharing gives arrange of 0.4% to 9.5% of savings in reduction of supplier costs. Procurement performance has enabled the customer's partnership channel to be more efficient due to better planning coordination, reduced needs for inventories with increased sales by focusing on selling what end-customer wants. In general, demand planning system is considered a means to obtain transparency in the supply chain and there by a means to dampen the demand variability.

However, Lennon (2006) indicated that procurement performance does not only rest on exchange technology but also to what extent the supplier is able to utilize the advance demand information received for planning purposes.

The study results concede with Southard (2002) who concluded that by using customer demand in implementing procurement performance, a firm may help reduce firm costs in the whole supply chain. Higher demand variability will lead supplier in to inefficiency in delivering product and increase delivery costs. The findings also agrees with (Powell, 2008) who asserts that eliminating one layer of information flow (supplier knowing demand outlook originally from end-customer through firm), demand variability for supplier has been reduced by 75% to 26% .This eventually reduced supplier cost through optimization of delivery schedule, on time product delivery and substantial inventory reduction, improved supplier lead-time more predictable replenishment visibility and increased supplier performance in delivering correct product mix.

5.3 Conclusions of the Study

The study concluded that E- tendering has enabled the logistic companies reduce the time for tender processing. It has enabled the suppliers to access tenders/quotation/requests any time anywhere in the world. Finally, e tendering has helped in eliminating noncompliant bids automatically. The study also concluded that data capture systems, automation of storage information, retrieval of warehouse information and automation in warehousing has enhanced Accuracy and efficiency of logistic companies. The study finally concluded that Electronic order has enhanced capturing and administering data electronically enhance reducing paper work and time waste and has made tracking shipping goods and product easy hence giving clients confident on logistic companies. Dissemination of logistic information to customers through electronic order enhances the performance of logistic companies. Validation of logistic information’s enhanced its performance.

The study is in agreement with Technological Determinism Theory which was developed by Thorstein Veblen (1857–1929), an American social scientist. Technological determinism (TD) states that technology is a social structure or a force which drives change. TD changes the organizational culture, structure, reporting line, norm and many other aspects including the modes of operations. The two main hypotheses that technological determinism depends are; belief that the technical base of a society is the fundamental condition affecting all patterns of social existence, second belief is that technological change is the single most important source of change in a society.

5.4 Recommendations and Implication of the Study

The study recommends the following to policy, practice and theory.

5.4.1 Policy and Practice

The study recommends to government and its policy-making agencies to strengthen the adoption of e-logistics in public institutions. This is because implementing e-logistics in institutions will ensure that there is improved quality, joint product design, information sharing, transparency and timely delivery. The study recommends that organizational managers should focus directly on supply chain functions such as logistics to bolster the competitiveness of the supply chains in which their organizations are integral partners. The study also recommends that the companies should use a strategic approach to logistics management practices through embracing modern technology and employee training. The study finally recommends that adoption of electronic order process. This will reduce operational costs, improves process efficiency, delivers greater centralized control over purchasing and may increase negotiating power with suppliers through order consolidation.

5.4.2 Theory Recommendation

The study recommends the use of Rogers' Diffusion of Innovation Theory in explaining how innovations are adopted by the institutions. The institutions should consider relative advantage, compatibility, complexity, trial-ability and observability of the innovation to be adopted before implementing. Therefore, logistic companies should adopt Rogers' Diffusion of Innovation Theory to generate and implement E-tendering systems that suits the organization in terms of operationalization and functionality of product in transit. For this reason, the complexity, compatibility, trial ability and observability of the innovation ideas definitely can lead to supply chain performance and even development of new innovation in future times.

5.5 Suggestions for Further Studies

The study suggests that a further research should be conducted using other variables other than those used in this study. This will ensure generalization of the results and fully establishing the phenomenon that exists. Future research should also be conducted using the longitudinal study designs in order to provide a better basement of how the study variables improve over time.

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APPENDICES

Appendix I Letter of Introduction

Cherono Eva,

Moi University

To: Whom it may concern

Dear Sir/Madam,

RE: ASSISTANCE TO FILL ACADEMIC SURVEY QUESTIONNAIRE

I am a master's student at the Moi University, conducting an academic research titled '**effect of Electronic logistics on supply chain performance of logistic companies in Nairobi, Kenya**". The findings will help the logistic companies to understand and appreciate the effect of utilizing Electronic logistics on supply chain performance. I humbly request your assistance in filling in the attached questionnaire.

Your participation in this research survey is greatly appreciated and your confidentiality and anonymity are guaranteed. Information gathered from this survey will only be used for data collection and during the analysis of the results; you will not be individually identified with your questionnaire or response. All collected Data were aggregated and grouped.

Regards,

Cherono Eva,

Appendix II: Questionnaire

(Please fill in the questionnaire as diligently as you can. Tick in the appropriate box where the question requires you to do so, where the space is provided. Please fill in your answer)

SECTION A: GENERAL INFORMATION

1. Period of service

   Less than 5years ☐

   5-10years ☐

   11-20years ☐

2. Educational Background

   College Diploma ☐

   Bachelor's Degree ☐

   Master's Degree ☐

SECTION B: effect of E- tendering on supply chain performance of logistic companies in Nairobi

3. To what extent do you agree with the following statements in regard to the effect of E- tendering on supply chain performance of logistic companies in Nairobi?

SA – Strongly Agree A – Agree N – Neutral D – Disagree SD – Strongly Disagree

STATEMENTS	**SA**	**A**	**N**	**D**	**SD**
E- tendering has enable the logistic companies to reduces the time for tender processing					
Through e tendering suppliers are able to access tenders/quotation/requests any time anywhere in the world					
With adoption of e-tendering there is no alteration of tender documents is impossible or easy to detect.					
Adoption of e tendering has help in eliminating noncompliant bids automatically					

SECTION C: effect of automated warehousing operations systems on supply chain performance of logistic companies in Nairobi

4. To what extent do you agree with the following statements in regard to effect of automated warehousing operations systems on supply chain performance of logistic companies in Nairobi?

SA – Strongly Agree A – Agree N – Neutral D – Disagree SD – Strongly Disagree

STATEMENTS	**SA**	**A**	**N**	**D**	**SD**
Data capture systems enhances the warehousing operations on organizational performance of logistic companies					
Automation of storage information enhances the warehousing operations on organizational performance of logistic companies					
Retrieval of warehouse information enhances logistic management and performance of organization					
Automation in warehousing has enhanced Accuracy and efficiency of logistic companies					

SECTION D: effect of Electronic order processing on supply chain performance of logistic companies in Nairobi

5. To what extent do you agree with the following statements in regard to the effect of Electronic order processing on supply chain performance of logistic companies in Nairobi?

SA – Strongly Agree A – Agree N – Neutral D – Disagree SD – Strongly Disagree

STATEMENTS	**SA**	**A**	**N**	**D**	**SD**
Electronic order has enhanced capturing and administering data electronically enhance reducing paper work and time waste					
Electronic ordering has made tracking shipping goods and product easy hence giving clients confident on logistic companies					
Dissemination of logistic information to customers through electronic order enhances the performance of logistic companies					
Validation of logistic information's enhanced its performance					

SECTION E: Effect of Enterprise Resource Planning on Supply Chain Performance of Logistic Companies in Nairobi

6. To what extent do you agree with the following statements in regard to effect of Enterprise resource planning on supply chain performance of logistic companies in Nairobi?

SA – Strongly Agree A – Agree N – Neutral D – Disagree SD – Strongly Disagree

STATEMENTS	**SA**	**A**	**N**	**D**	**SD**
Budgeting systems has help organization to improve their budgeting in supply chain performance					
Enterprise resource planning has help in product tracking and improve supply chain performance					
Distribution requirement planning applied in the company has enhance supply chain performance					
Demand planning system applied in the company has enhance supply chain performance					

SECTION E: Supply Chain Performance

To what extent do you agree with the following statements in regard supply chain performance of logistic companies in Nairobi?

SA – Strongly Agree A – Agree N – Neutral D – Disagree SD – Strongly Disagree

STATEMENTS	**SA**	**A**	**N**	**D**	**SD**
Automated warehousing operations systems has made warehouse operation efficient and accurate information's concern icing storage hence customers are satisfied					
Electronic ordering system has enhanced customers satisfaction because they can track their goods on transit					
Electronic order processing has ensured logistic companies to have a wide market share					
logistic companies in have ensure they cover a wide area in their operations with safety					

THANK YOU FOR YOUR TIME

Appendix III Correlation Results

Correlations

		Supply Chain Performance	E-tendering	Automated Warehousing	E-order Processing	Enterprse Resource Planning
Supply Chain Performance	Pearson Correlation	1	.650**	.425**	.650**	.511**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	251	251	251	251	251
E-tendering	Pearson Correlation	.650**	1	.395**	.608**	.448**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	251	251	251	251	251
Automated Warehousing	Pearson Correlation	.425**	.395**	1	.442**	.233**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	251	251	251	251	251
E-order Processing	Pearson Correlation	.650**	.608**	.442**	1	.469**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	251	251	251	251	251
Enterprse Resource Planning	Pearson Correlation	.511**	.448**	.233**	.469**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	251	251	251	251	251

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

Appendix IV: Factor Analysis Results

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.748
Bartlett's Test of Sphericity	Approx. Chi-Square	1829.334
	df	190
	Sig.	.000

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.357	16.783	16.783	3.357	16.783	16.783	2.758	13.792	13.792
2	3.164	15.820	32.603	3.164	15.820	32.603	2.657	13.286	27.077
3	2.533	12.666	45.269	2.533	12.666	45.269	2.656	13.278	40.355
4	1.955	9.777	55.047	1.955	9.777	55.047	2.588	12.939	53.294
5	1.837	9.186	64.232	1.837	9.186	64.232	2.188	10.938	64.232
6	.789	3.947	68.179						
7	.746	3.732	71.911						
8	.691	3.456	75.367						
9	.646	3.228	78.595						
10	.569	2.846	81.441						
11	.509	2.544	83.985						
12	.465	2.323	86.307						
13	.460	2.300	88.607						
14	.414	2.068	90.675						
15	.392	1.962	92.637						
16	.345	1.723	94.359						
17	.336	1.682	96.041						
18	.312	1.559	97.601						
19	.252	1.260	98.861						
20	.228	1.139	100.000						

Extraction Method: Principal Component Analysis.

Rotated Component Matrix[a]

	Component				
	1	2	3	4	5
E- tendering has enable the logistic companies to reduces the time for tender processing				.756	
Through e tendering suppliers are able to access tenders/quotation/requests any time anywhere in the world				.804	
With adoption of e-tendering there is no alteration of tender documents is impossible or easy to detect.				.833	
Adoption of e tendering has help in eliminating noncompliant				.760	
Data capture systems enhances the warehousing operations on organizational performance of logistic companies			.779		
Automation of storage information enhances the warehousing operations on organizational performance of logistic companies			.799		
Retrieval of warehouse information enhances logistic management and performance of organization			.829		
Automation in warehousing has enhanced Accuracy and efficiency of logistic companies			.767		
Electronic order has enhanced capturing and administering data electronically enhance reducing paper work and time waste	.840				
Electronic ordering has made tracking shipping goods and product easy hence giving clients confident on logistic	.848				
Dissemination of logistic information to customers through electronic order enhances the performance of logistic	.836				
Validation of logistic information's enhanced its performance	.771				
Budgeting systems has help organization to improve their budgeting in supply chain performance					.769
Enterprise resource planning has help in product tracking and improve supply chain performance					.664
Distribution requirement planning applied in the company has enhance supply chain performance					.780
Demand planning system applied in the company has enhance supply chain performance					.710
Automated warehousing operations systems has made warehouse operation efficient and accurate information's concern icing storage hence customers are satisfied		.634			
Electronic ordering system has enhanced customers satisfaction		.870			
Electronic order processing has ensured logistic companies to have a wide market share		.833			
logistic companies in have ensure they cover a wide area in		.788			

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 5 iterations.

Appendix V: Regression Results

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.750[a]	.562	.555	.66696604	.562	78.999	4	246	.000

a. Predictors: (Constant), Zscore: Enterprse Resource Planning, Zscore: Automated Warehousing, Zscore: E-tendering, Zscore: E-order Processing

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.989E-15	.042		.000	1.000
	Zscore: E-tendering	.333	.055	.333	6.007	.000
	Zscore: Automated Warehousing	.112	.048	.112	2.352	.019
	Zscore: E-order Processing	.308	.057	.308	5.372	.000
	Zscore: Enterprse Resource Planning	.191	.049	.191	3.879	.000

a. Dependent Variable: Zscore: Supply Chain Performance