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EFFECT OF LOGISTICS AUTOMATION ON SUPPLY CHAIN PERFORMANCE IN KENYA MEDICAL SUPPLIES AUTHORITY

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Abstract

Purpose: *The main objective of this study was to determine effect of logistics automation on supply chain performance in Kenya Medical Supplies Authority*

Materials and methods*; The study adopted the descriptive research design, research design refers to all the procedures selected by a researcher for studying a particular set of questions or hypothesis and also a framework for the collection and analysis of data that is suited to the research question. The study employed a census approach to collect data from the 91 respondents working in the states corporation mainly involved in the management of procurement process major on logistics operation management hence no sampling techniques was used. The primary data of the study was collected by the use of questionnaire. The Pilot testing was carried out to help find out if the questions was able to measure what they are supposed to measure, appropriateness and practicality, the clarity of the wording and whether the respondents interpreted the questions in the same way. Tables were used to display the rate of responses and to facilitate comparison. Qualitative reports was presented in form of essay, which was discussed as per the study objectives aligned with the theories and empirical study. The collected research data was checked for any errors and omissions, coded, defined and then entered into Statistical Package for Social Science (SPSS Version 24), Quantitative data was coded into numerical codes, which represented various variables. These codes then were being captured into computer for analysis*

Results*: The study also found out that a complete logistics and warehouse automation system drastically reduce the KEMSA workforce required to run a facility, with human input required only for a few tasks, such as picking units of product from a bulk packed case. The assistance is provided with equipment such as pick-to-light units. Smaller systems only are required to handle part of the process.*

Recommendations: *The study recommends that Automation should give KEMSA a clear visibility of freight rates as well as available modes of transportation. This allowed KEMSA to make strategic decisions over what carrier ships the cargo, the transit time and the rate. In this way, savings can actually be predictable, thus allowing the business to be more deliberate about savings and choices.*

Keywords*: Logistics Automation, Transport Management Systems, Enterprise Resource Planning, GPS-Tracking*

1.0 INTRODUCTION

1.1 Background of the study

The study determined the Effect of lean logistics practices on Supply Chain performance of Kenya Medical Supplies Authority. This chapter aims at providing sufficient information for better understanding of the study. Specifically the chapter provides information on lean logistics practices concept and Supply Chain performance on global perspective, regional perspective and then narrows down to the local issues that the study addressed. It highlights on the background information, statement of the problem, general and specific objectives, and research questions, justification of the study and the scope of the study.

According to Mataura, (2011), logistics involves co-ordinated efforts of transportation, warehousing, packaging and inventory management. Logistics define the Process of planning, implementing, and controlling the efficient effective flow and storage of goods, services, and related information from point of origin to point of consumption for the purpose of conforming to customer requirements (Negrao, & Marodin, 2016). The definition explains that inbound, outbound, internal, and external movements, and return of materials for environmental purposes that the integrated management of all the activities required to move products through the supply chain.

According to Odadi, (2012), explains that Lean Logistics is described as a way to recognize and eliminate wasteful activities from the supply chain in order to increase product flow and speed. In order to achieve Leaner Logistics; organizations need to implement leaner thinking. Organizations that incorporate lean thinking into their supply chain can benefit from improved customer service, reduced environmental impact by reducing waste and even overall corporate citizenship.

Lean is about the elimination of waste and the increase of speed and flow. Although this may be over-simplification, the ultimate objective of Lean is to eliminate waste from all processes. At the top of the list of known wastes, according to Lean theory is the elimination of inventory (Purvis & Naim, 2014). More simply, any inventory should be eliminated that is not required to support operations and the immediate need of the customer. Lean logistics management delivery allows the dealer to reduce overall stock levels by well over half while carrying a wider range of parts. It also improves service rates to waiting customers and eliminates delays in binning parts and cuts wasted walking and waiting time for the mechanics picking up parts. Freed up space can be put to revenue-earning use. One of the key roles for the dealer service manager is to level the workflow and plan regular service work in the same manner as the warehouse.

Lean Logistics serves as the logical interface between the critical functions with transportation providing a vital linking role. Any waste that can be eliminated in firms' logistics systems will translate into substantial savings. Reductions in total logistics costs will result from lower inventory and reduced warehousing costs, and increased productivity. Lean logistics provide a means of achieving total system improvements because logistics plays a vital linking role between suppliers and customers, Pieters, *et al.*, (2012). Lean logistics refers to the superior ability to design and administer systems to control movement and geographical positioning of raw materials, work-in-process and finished inventories at the lowest cost.

Logistics and supply chain has been one of the areas in which waste reduction practices were implemented successfully. In particular, warehousing and transportation processes functions offer a good opportunity for reducing the wastes in the overall logistics system, Verhoef & Inman, (2015) Therefore, if the elimination of waste can be relevant to the service environment, which differs significantly from a standard manufacturing

environment, logistics operations should also be able to adopt the elimination of waste in its operations. According to Meidute & Litvinenko, (2014), states that Distribution performance measurements are not new to logistics and supply chain lean logistics practices are measured based on the firm's capability to deliver timely and complete orders to customers. Transaction cost of delivering wrong items to customers can be very costly (Denison & Yusuf, 2013). Leveraging distribution capabilities may produce an improved performance for the organization.

The inbound process deals with all movements of goods from the moment they are delivered until they are stored in the warehouse, as well as all administrative processes needed to perform this task (Forslund, 2012). The outbound process deals with the reverse process, all movements of goods from storage in the warehouse until the moment they are shipped, as well as all administrative processes needed to perform this task. As for the transportation process, it deals with all movements of goods outside the scope of the warehouse, all transportation of goods between the moment of shipment and the moment of delivery.

1.1.1 Global Perspective on Lean Logistics Practices

Indian logistics industry has shown exponential growth in recent years and the demand for logistics services has improved up to a great extent. More and more customers are moving away from cost plus mechanisms to variables models of payment for their logistics outsourcing (Tilokavichai & chandrachai 2012). At this point, lean logistics has become a significant part of the value chain for the majority of the manufacturing firms in India. Through adding value by elimination of waste, it helps companies in their organized growth of logistics activities from planning to procurement, warehousing and distribution.

Being faced with intense competition due to an increasing globalized economic playfield, the lean management view puts forth -now more than ever- its importance and its necessity for the survival of companies nowadays. However, nowadays there are some unresolved issues within the lean field that managers and academics struggle with, and deserve attention (Forslund, 2015). LSPs especially face challenges due to their role within the production and supply chain process when implementing lean management practices. The efficient distribution of goods from factories to the marketplace is now recognised as a major determinant of company profitability. The marketplace is characterized by a large variety of products with increasing shorter life cycles. This resulted into largely varying product assortments from LSPs customers. (Forslund, 2015). Businesses and consumers demand for Just in time deliveries of the right products, in the right quantity, in the right quality and at the right time. This has led to an offering of freight to LSPs with high variety, high frequency deliveries and small batch sizes.

According to Verhoef & Inman, (2015), states that China have already been outsourcing sequencing to tier suppliers for modules such as seats, but now the split between sequencing is evening out between what OEMs, suppliers and logistics providers do. Depending on the OEM's decision and the type of components," concludes Dudek. Sustained high growth in China's automotive industry has generated increasing demand for logistics services, and more recently for outsourced services that go beyond transport for inbound logistics.

The Lean Logistics Transportation Network empowers shippers, carriers and other members to reduce costs, improve services, and gain complete visibility. The approach is been practiced in several countries which includes Canada, the United Kingdom, and Spain (Wang, & Gong, 2014). American manufacturers adopting lean production, JIT logistics has provide a means of achieving total system improvements because logistics plays a vital linking role between suppliers and customers. Lean logistics refers to the superior ability to design

and administer systems to control movement and geographical positioning of raw materials, work-in-process, and finished inventories at the lowest cost (Yi-Ming, 2013).

1.1.2 Regional Perspective on Lean Logistics Practices

The South Africa food retail environment is characterised by diverse dynamics that intensifies the level of competition within the market place, literally fighting for the same consumer and shopper. Many companies purchase raw materials from the vendor with the lowest bid. Yazdanparast, & Swartz, (2010), Lean logistics, with the help of Six Sigma or other statistical tools, enables companies to see the total cost of using a specific total transport cost. Distribution points do the materials pass through before getting to their destination. The materials come packaged as a production line- ready ship set to speed the product's throughput. Precise statistical analysis can help clarify the big picture. The key element in a logistics chain is the transportation system. The logistics costs are occupied by transportation, additionally the transportation systems has a huge influence on the performance of logistics systems (Mataara, 2011). (Tseng et al., 2005). The transportation process covers all Lean for Logistic Service Providers movements of freight outside the LSP warehouse as well as the administrative efforts needed to guide and complete these movements. Naim, & Gosling,(2011)stated that in south Africa a manufacturing supply chain can be viewed as a sequence of steps consisting of the modification of a resource at a point (manufacturing) followed by the transfer of the product over space (transportation). Transportation arises because of the spatial distribution of resources, skill sets and customers,

According to Panizzolo & Gore (2012) adjusting stock delivery intervals and automate product replenishment in south African firms enables the counterpart to Lean logistics practices processes in Lean retailers is the achievement of a demand-driven replenishment. Thus, when store replenishment is motivated and triggered by consumer demands, both the retailer and manufacturer can avoid order fluctuations, volatility as well as reduce both under-stocking and over-stocking.

The goal of replenishment management is to ensure a consistently high level of merchandise availability, while keeping the store inventory as low as possible. The merchandise availability and store inventory levels are determined by a complex interplay of logistics demand forecasts, sales, reorder points, delivery slots or intervals, and logistics processes at the store level (Meidute & Litvinenko, 2014). If this interplay were suboptimal, the results would be a mixture of OOS or overstocks. Thus Lean logistics processes ensure that work is kept simple and transparent and that all activities create value for the customers and shoppers.

1.1.3 Local Perspective on Lean Logistics Practices

Lean Logistics management, according to the local and multinational organisations in Kenya and east African countries is that part of supply-chain management that plans, implements and controls the efficient, effective forward and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirements (Naima & Gosling,2011). Lean approach under Supply-chain and logistics management encompasses the planning and management of all activities involved in sourcing and procurement, conversion and all logistics management activities (Lysons&Farrington,2012).

According to Bernard (2015), the transport activity required the Bollore Logistics team to improve information flows between partners along the supply chain including shippers, freight forwarder, customs, and airline or shipping line/consignee.by implementing new lean logistics services to remain competitive while cutting the

multimodal transport operation within the east Africa boarders. The transport activity required the Bollore Logistics team to improve information flows between partners along the supply chain including shippers, freight forwarder, customs, airline or shipping line, consignee by implementing new IT applications and tools (Denison & Yusuf, 2013).

Previously customers placed orders to Bollore via email or phone, but a year ago, we implemented an online booking tool interfaced with our internal Transport Management System (TMS) (Odadi, 2012). This development gives higher shipment tracking visibility to shipper's consignees, and improves internal productivity within Bollore organization.

Majority of the logistics firm in Kenya are focus on the lean transport systems to compete with modern rail transport systems Mataura, (2011). The lean approach modifications involved structural rationalization that streamlined packing, storing and scanning procedures. It also introduced Projects to develop standardized work, clearer progress status of processing by deploying performance-measuring tools. Loose packing and anchoring, for was revised by introducing motorized conveyors between work areas to reduce transport time. The overall organization of the warehouse was also reconfigured to enhance efficiency of the chain of activity in it (Gitahi, & Ogollah, 2014).

1.1.4 Kenya Medical Supplies Authority

The Kenya Medical Supplies Authority (KEMSA) is a state corporation established (under the cap 466 of the laws of Kenya through legal notices No.17 of 11 February 2000) with the mandate to procure, warehouse and distribute medical commodities to all public health facilities in Kenya. The medical Supplies are distributed from the KEMSA's Supply Chain Centre to the doorsteps of each of the public facilities and testing sites. Presently, KEMSA serves 371 hospitals, 4,415 rural health facilities and 5,047 sites that offer rapid testing across Kenya.

KEMSA acts as the representative of Kenya in the purchase, storage and distribution of drugs to the various health facilities and institutions. Despite being a large, well-funded and established organization that enjoys the protection of the Kenya government and state agencies, KEMSA has not been successful in its key functions of purchasing, storage, distribution of drugs and related Supplies owing to poor practices currently employed in its procurement and supply department, (Deadman, 2012). This has caused the organization to assume a negative, dysfunctional and unfavorable image among the stakeholders, competitors' government organs and the Kenya public (Ministry of Health Journal November 2012).

KEMSA Procure, warehouse and distribute drugs and medical Supplies for prescribed public health programs, the national strategic stock reserve, prescribed essential health packages and national referral hospitals. Establish a network of storage, packaging and distribution facilities for the provision of drugs and medical Supplies to health institutions (Bernard, 2015). Collect information and provide regular reports to the national and County Governments on the status and cost effectiveness of procurement, distribution and value of prescribed essential medical Supplies delivered to health facilities, stock status and any other aspects of supply system status and performance which may be required by stakeholders.

1.2 Statement of the Problem

The pharmaceutical industry in Kenya has had its fair share of challenges, ranging from ineffective supply chain systems, inadequate delivery for drugs and other health commodities, (Bernard, 2015). This has necessitated strategic approach to management of lean logistics that meets the needs of the country's devolved

health system. Today's KEMSA logistics system be it in house or 3PLs, are facing serious problems in inventory management , transportation, cost optimization and system flow of freight forwarding . In order to achieve maximum optimization and to eliminate wasteful activities from low adaption of lean methods is indispensable rapidly than ever before (Njoroge, 2016).

KEMSA serves 371 hospitals, 4,415 rural health facilities and 5,047 sites that currently carry out rapid testing across the country. Order cycle length is reduced from 7.1 days to 3.9 days which not yet below the 1-2 days, third-party logistics companies are used for a wide variety of logistics services including: warehouse management (45%), logistics information systems (32%), fleet management/operations (28%), and order fulfilment (26%), cost reduction (54%), productivity improvement (49%), and service improvement (42%). The cost reduction has not reached optimization levels of 80% hence more strategies on lean logistics should be considered (Bernard, 2015).

The main aim of lean logistics to eliminate waste, in logistics, excessive lead times and energy usage, leftover space for inventory, impractical human effort, defective products,overproduction,excess motion ,unnecessary processing steps, translate to waste has the potential to address the above issues, identify business and process gaps and challenges, and drive the creation of a robust infrastructure, the optimization of the Information Flow, ensuring end-to-end improvement on the Products (Odadi, 2012).These improvements address the flow of information and materials through processes as well the enhancement of value-adding process steps that create and deliver the product for the customer.The research seeks to establish the Effect of lean logistics practices on Supply Chain performance of Kenya Medical Supplies Authority.

1.3 Research Objectives

The study was guided by the general and specific objectives.

1.3.1 General Objective

The general objective of the study was to determine the Effect of lean logistics practices on supply chain performance of Kenya Medical Supplies Authority.

1.3.2 Specific Objectives

The specific objectives of the study are:

i. To determine the influence of Transport Management Systems on supply chain performance of Kenya Medical Supplies Authority

ii. To establish the influence of Enterprise Resource Planning on Supply Chain performance of Kenya Medical Supplies Authority

iii. To examine the influence of GPS-Tracking on Supply Chain performance of Kenya Medical Supplies Authority

2.0 LITERATURE REVIEW

2.1 Introduction

The purpose of literature review is to identify what is already known. This chapter reviews the various theories that exist on Effect of lean logistics practices on Supply Chain performance. It specifically covers the empirical studies, conceptual framework, and critique of study, the literature review and the research gaps.

2.2 Business Process Reengineering Theory

The study was based on Theory of Business Process Reengineering Theory in establishing influence of Logistics Automation on Kenya Medical Supplies Authority. The Business Process Reengineering (BPR) theory assists the study in evaluating the procurement performance firm in training public institution firms in Kenya. BPR theory is a business management strategy, originally pioneered in the early 1990s, focusing on the analysis and design of workflows and business processes within an organization. BPR theory aimed to help organizations fundamentally rethink how they do their work in order to dramatically improve customer service, cut operational costs, and become world-class competitors. BPR theory seeks to help companies radically restructure their organizations by focusing on the ground-up design of their business processes. According to Desel, Pernici & Weske (2014), a business process is a set of logically related tasks performed to achieve a defined business outcome. Re-engineering emphasizes a holistic focus on business objectives and how processes are related to them and encouraging full-scale recreation of processes rather than iterative optimization of subprocesses.

BPR theory is also known as business process redesign, business transformation, or business process change management. In order to achieve the major improvements, BPR theory is seeking for the change of structural organizational variables, and the use of IT is conceived as a major contributing factor to achieving benefits. BPR theory derives its existence from different dimensions like organization, technology, strategy and people (Desel, Penrice & Weske, 2014). Business strategy is the primary driver of BPR theory initiatives and the other dimensions are governed by strategy's encompassing role. The organization dimension reflects the structural elements of the company, such as hierarchical levels, the composition of organizational units, and the distribution of work between them. Technology is concerned with the use of computer s and other forms of compublic universities nication technology in the business (Desel, Pernici & Weske, 2014). In BPR theory, IT is generally considered as playing a role as an enabler of new forms of organizing and collaborating, rather than supporting existing business functions. The human resources dimension deals with aspects such as education, training, and motivation and rewards (Desel and Weske, 2014).

2.3 Logistics Automation

Logistics Automation and Warehouse Management systems (WMS) are built on industry standard technologies and are tightly integrated with our extensive internal data warehouse, reporting, and interface systems. The systems to provide efficient, hands-off information processing, fast and simple access to information, and the ability to accommodate the unique data elements our clients require (Madenas& Woodward, 2014). Whether it is through the web-based client portal or automatically triggered reports pushed out through email, which provides clients with real-time visibility to their transportation and warehouse information. Which integrate everything with proven process and hard-working people to give our customers the best solutions and service possible? Transport management systems platforms that include an integrated solution for proactive

Distribution Planning, reactive outage management, and real-time two way monitoring and control have been renamed Advanced Distribution Planning Systems.

According to Negrao, & Marodin (2016), the right GPS tracking system makes tracking company vehicles simple and effective with improved coordination of assets, faster delivery times and better fleet management, truck tracking systems can dramatically improve efficiencies (Maria, 2014). The tracking systems have the right technology and equipment to make it easier than ever for fleet management professionals to effectively cut costs and improve service. The system allows fleet managers to observe vehicles remotely, receiving information about vehicle location, direction of travel and status of unit historically.

2.4 Supply Chain performance

According to Mutuerandu& Iravo, (2014), at the strategic level, Lean thinking sits alone and is relevant to all aspects of the framework with the goal of understanding value creation and customer value. Therefore, the focus at the strategic level of Lean thinking is effectiveness and the focus at the operational level of Lean production is efficiency. The concept of Lean thinking at a strategic level is operationalized by a set of principles summarized as the five steps to becoming Lean These include specification of value; the identification of the value stream; making the value-creating steps flow; promoting a pull culture; and consistently pursuing perfection. Supporting the waste elimination and value-adding (VA) focus of the lean principles.

The Lean supply chain (LSC) can therefore be considered as an integrated process of driving all facets of the organizations to be aligned with the primary objective of reducing or eliminating waste and intensifying the focus on customer value creation (Njoroge, 2016). According to Purvis & Naim (2014), This is an operational and strategic management philosophy that effects the continuous regeneration of suppliers and service partners' network, empowered to execute superlative, unique customer-winning value at the lowest cost through the collaborative, real-time synchronization of product movements, service delivery, demand and supply priorities, vital marketplace information and logistical delivery capabilities.

3.0 METHODOLOGY

The study adopted the descriptive research design, research design refers to all the procedures selected by a researcher for studying a particular set of questions or hypothesis and also a framework for the collection and analysis of data that is suited to the research question. The study employed a census approach to collect data from the 91 respondents working in the states corporation mainly involved in the management of procurement process major on logistics operation management hence no sampling techniques was used. The primary data of the study was collected by the use of questionnaire. The Pilot testing was carried out to help find out if the questions was able to measure what they are supposed to measure, appropriateness and practicality, the clarity of the wording and whether the respondents interpreted the questions in the same way. Tables were used to display the rate of responses and to facilitate comparison. Qualitative reports was presented in form of essay, which was discussed as per the study objectives aligned with the theories and empirical study. The collected research data was checked for any errors and omissions, coded, defined and then entered into Statistical Package for Social Science (SPSS Version 24), Quantitative data was coded into numerical codes, which represented various variables. These codes then were being captured into computer for analysis.

4.0 RESEARCH FINDINGS ANALYSIS AND DISCUSSION

4.1 Introduction

This chapter presents analysis and findings of the study as set out in the research methodology. The study sought to determine the Effect of Effect of lean logistics practices on supply chain performance of Kenya Medical Supplies Authority. The data was gathered exclusively from questionnaire as the research instrument designed in line with the objectives of the study.

4.2 Response Rate

The study targeted all 91 officers in transport and logistic department who included Transport Managers , Distribution officers, Dispatch officers and Logistics Officers Out of the 91 distributed questionnaires, 83 were filled and returned. This translated to a response rate of 91.2%. This implies that the response was good enough and representative of the population .the finding in this study concured with those of Mugenda and Mugenda, (2012), indicated that a response rate of 50% is adequate for analysis and reporting; a rate of 60% is good and a response rate of 70% and above is excellent Therefore, the response rate of 91.2% was excellent for the study.

Table 4.1: Response Rate

Response	Frequency	Percentage
Returned questionnaires	83	91.2
Unreturned questionnaires	8	8.8
Total	**91**	**100**

4.3 Reliability Results

Table 4.2 illustrates the findings of the study concerning the reliability analysis. In this study, reliability was ensured through pilot testing on a sample of 9 respondents. This represents 10% of the sample as recommended by Mugenda and Mugenda (2012). Reliability test was done using Cronbach's Alpha to measure the internal consistency of the data variables. From the findings, the coefficient for Third Party Logistics was 0.781, Cronbach's alpha coefficients for Distribution Planning was 0.745, Cronbach's alpha coefficients for Logistics Automation was 0.801while Cronbach's alpha coefficients for Fleet Management was 0.825. This implies that the coefficient was higher than 0.70 threshold, showing that the instruments were reliable. The study finding concurred with those of Cooper & Schindler, (2014) that Pilot studies fulfil a range of important functions and can provide valuable insights for other researchers though conducting a pilot study does not guarantee success in the main study, but it does increase the likelihood of success.

Table 4.1: Reliability Results

Variable	Cronbach's	No of Item	Remarks
Third Party Logistics	.781	5	Accepted
Distribution Planning	.745	5	Accepted
Logistics Automation	.801	5	Accepted
Fleet Management	.825	5	Accepted
Overall	**.870**		

4.4 Demographic findings

4.4.1 Gender of the respondents

To get a better understanding of the research demographics of population in general and the sampled population in specific, the study enquired about the gender of the participants. A presented in the figure 4.1 below provides that, 66% of the participants were male, while the remaining 34 were female. This implied that gender composition in the sampled population was relative to the number of male and female employees working in the company. The finding in this study concurred with those of Sekaran& Bougie (2013). That the demographic profile of the respondents is an important aspect of consumer research as the nuances of consumer behavior can vary with changes in the demographic variables.

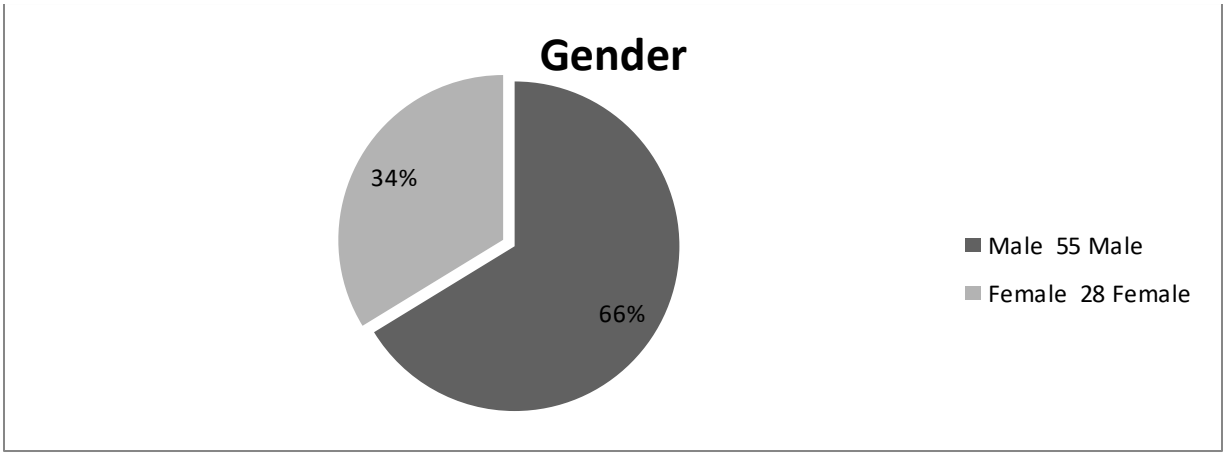


Figure 4.1: Gender of the Respondents

4.4.2 Education Level of the respondents

As observable form the table Table4.3, majority of the participants had a bachelor's degree or university diploma. These two categories had a cumulative percentage of 77% Of the respondents with either qualification with a master's degree or diploma .only 23 % of the respondents had Master's had qualification. This implied that with half of the population the KEMSA transport and logistics department had college diploma and master's degree. Along with the educational background, they had the abilities within their career to focus on management of logistics operations functions competently. The finding in this study agreed with those of that Saunders and Lewis (2014); the education profile reveals the level of educational attainments of respondents that could be used to indicate the potential skill that will be instrumental for articulating the right skill in place of work that could influence present and future department decision.

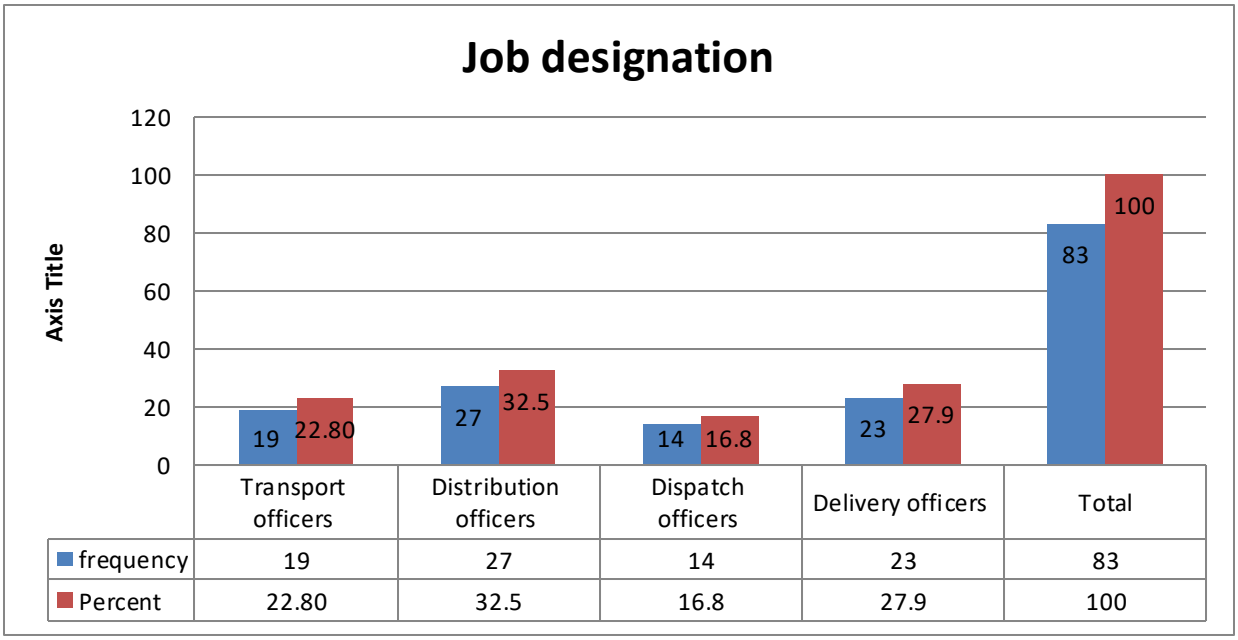
Table 4.2:Education Level of the respondents

Education level	Frequency	Percent
college	28	33.7
Bachelor's degree	36	43.3
Master's degree	19	23
Total	83	100.0

4.4.3 Job designation of the respondents

As summed up in the Figure 4.2: below, the study further obtained the job designation of the respondents picked from staff members involved in transport and logistics department The respondents were requested to indicate their job category. From the findings in Figure 4.2: which showed that the percentage of staff working in Transport Managers was 22.80% of the respondents , Distribution officers was 32.5% of the respondents , Dispatch officers was 16.8 of the respondents and Logistics Officers 27.9 % of the respondents was relatively equal This implied that data was collected from staffs who were majorly involved in the management of the daily transport and logistics and understood well effective strategies to minimize on the cost of logistics

The finding in this study concurred with those of Pieters et al., (2012). That Knowledge of principles and methods for moving people or goods by air, rail, sea, or road, including the relative costs and benefits Quality control,



	Transport officers	Distribution officers	Dispatch officers	Delivery officers	Total
frequency	19	27	14	23	83
Percent	22.80	32.5	16.8	27.9	100

Figure 4.2: Job designation of the respondents

4.4.4 Respondents Period of Working

From the findings as indicated in Table 4.4 below, the respondents had worked in KEMSA, 17.4% had worked for a period of 1 to 5 years, those who had worked for duration of 6 to 10 years were 21.7 of the respondents , the respondents who had worked for the period 11 to 15 years were 34.9% the respondents who had worked for over 16 years were 26.0% This is a clear indication that most of the respondents had worked long enough in KEMSA and were well experience in the strategic management of the optimizing on lean logistics. Hence delivering effective cost management within an operating model that connects organizational goals by ensuring essential medicine are delivered with the right cost and within the right time .the finding in this study concurred with those of Purvis & Naim,(2014) that Job requires establishing and maintaining personally challenging achievement goals and exerting effort toward mastering tasks.

Table 4.3: Respondents Period of Working

Years	Frequency	Percent	Cumulative Percent
1-5 years	11	17.4	17.4
6-10 years	18	21.7	39.1
11-15 years	29	34.9	74.0
over 16 years	25	26.0	100.0
Total	**83**	**100.0**	

4.5 Descriptive Analysis

4.5.3 Logistics Automation

The respondents were asked to indicate the extent of Logistics Automation affect supply chain performance of Kenya Medical Supplies Authority. From table 4.5 majority of the respondents agreed that Using TMS optimize shipment with the selected carrier, and later to support Cost effective transport management which had a mean score of 3.86 and standard deviation of 0.89.the findings indicated that The automation system Reduce invoice errors Automating the freight payment and audit processes, users which reduce errors that arise from manual procedures which was supported by a mean of 4.31 and standard deviation of 0.92.to a moderate extent the respondents stated that Trucks have the built-in battery that lets the device track location up to three hours even if the vehicle is not powered on for monitoring the drivers progress which was supported by a mean of 3.88 and standard deviation of 0.99.the finding indicated that Identifying GPRS routing for effective distribution enabled Administration monitoring of the truck movement ,speed limits and direction which was supported by a mean of 4.18 and standard deviation of 0.88.

The study indicated that Logistics officers remotely alerted to allow a dispatcher or other authorized personnel to evaluate the situation, communicate with the driver, and/or potentially disable the vehicle off route with a mean score of 4.25 and standard deviation of 0.97.this implies that logistic automation enabled KEMSA to optimize the trucks and drivers capacity hence enabling cost reduction and effective deliveries The findings in this study concurred with those of Negrao, & Marodin (2016) that Automation, in simple definition, is the reduction of human intervention in applications, processes and machinery of an organisation. The most notable benefit of automation is the labour savings a company will get.

Table 4.5 Logistics Automation

Statements	Min.	Max.	Mean	StD
The use of TMS Planning Module offering the user various suggested routing solutions.	1.00	4.00	3.86	0.89
Using TMS optimize shipment with the selected carrier, and later to support Cost effective transport management.	2.00	5.00	4.29	0.91
TMS integrate well with enterprise order management, warehouse management and purchasing systems	1.00	4.00	4.02	0.92
The system Reduce invoice errors Automating the freight payment and audit processes, users can reduce errors that may arise from manual procedures.	2.00	5.00	4.31	0.92
Trucks have the built-in battery that lets the device track location up to three hours even if the vehicle is not powered on	1.00	4.00	3.88	0.99

Organization Monitoring truck travelled distance and current GPRS positioning	2.00	4.00	4.16	0.86
Identifying GPRS routing for effective distribution Administration monitoring for the truck movement ,speed limits and direction	2.00	4.00	4.18	0.88
Logistics officers remotely alerted to allow a dispatcher or other authorized personnel to evaluate the situation, communicate with the driver, and/or potentially disable the vehicle	2.00	5.00	4.25	0.97

4.5.5 Supply chain Performance

The study sought the extent to which indicators of level of Supply chain performance influenced performance of Kenya Medical Supplies Authority. The respondents were asked to indicate the extent to which the various factors of lean logistics practices affect supply chain performance of Kenya Medical Supplies Authority. The finding is shown in Table 4.6, the respondents indicated largely that understanding the main effects of lean implementation influenced performance with 48.19% of the respondents strongly agreeing, 31.33% of the respondents agreeing and only 3.61% of the respondents disagreed to the statement. The study indicated that Using internal auditing systems for benchmarking internal operation sites on Lean-focused performance reporting structure with 44.58% of the respondents strongly agreeing, 40.96% of the respondents agreeing .the study established that Ability to track and trace consignments; timeliness of shipments in reaching destination within the scheduled or expected delivery time to a great extents 39.76% of the respondents agreed with 45.78% of the respondents agreeing and only 1.20% of the respondents disagreed.

The study further provided that considering Timeliness of shipments in reaching destination within the scheduled or expected delivery time was an aspect of performance with 15.66% of the respondents strongly supporting the statement , 60.24% of the respondents agreeing , 18.07% of the respondents were neutral and 1.20% of the respondents disagreed with the statement. This implied that the impact of the lean logistics operations enabled KEMSA to streamline it performance on the key performance indicators of transport, including delivery time, cost and customer services. The finding in this study agreed with those of that Wong & Karia, (2010) Since automation has allowed real-time freight rates and availability of transportation modes, this has supported customers to see how much is the freight cost and the delivery period through automatic notification**.**

Table 4. 6 supply chain Performance

Statements	**1**	**2**	**3**	**4**	**5**
Understanding the main effects of lean implementation influenced performance	3.61%	3.61%	13.25%	31.33%	48.19%
Exploring differences and complementarities in the production decision areas of lean organizations	3.61%	4.82%	19.28%	42.17%	30.12%
Using internal auditing systems for benchmarking internal operation sites on Lean-focused performance reporting structure	2.41%	2.41%	9.64%	40.96%	44.58%
Organizations prefer to use new fleet as a strategy for cost reduction where the used fleet is sold so that a new fleet is maintained.	1.20%	4.82%	12.05%	59.04%	22.89%

Competitively priced shipments; competence and quality of logistics services	3.61%	3.61%	16.87%	45.78%	30.12%
Ability to track and trace consignments; timeliness of shipments in reaching destination within the scheduled or expected delivery time.	1.20%	4.82%	24.10%	30.12%	39.76%
Efficiency of the clearance process	1.20%	1.20%	16.87%	42.17%	38.55%
Competence and quality of logistics services	3.61%	4.82%	10.84%	24.10%	56.63%
Timeliness of shipments in reaching destination within the scheduled or expected delivery time.	1.20%	4.82%	18.07%	60.24%	15.66%

4.6.2 Regression Analysis

A multiple linear regression analysis was done to examine the relationship of the independent variables with the dependent variable. The R2 is the coefficient of determination. This value explains how supply chain performance of Kenya Medical Supplies Authority varied with Transport Management Systems, Enterprise Resource Planning and GPS-Tracking. The model summary table shows that four predictors can explain 86.2% of change supply chain performances, which can be, explain by variation in Transport Management Systems; Enterprise Resource Planning GPS-Tracking an implication that the remaining 13.8% of the variation in supply chain performance could be accounted for by other factors not involved in this study. This shows that the variables are very significant therefore need to be considered in any effort to boost supply chain performance of Kenya Medical Supplies Authority.

Table 4.7 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.929a	.862	.857	.423

a. Dependent Variable: Supply Chain Performance
b. Predictors: (Constant), Transport Management Systems, Enterprise Resource Planning GPS-Tracking

4.6.3 Analysis of Variance

ANOVA statistics of the processed data at 5% level of significance shows that the value of calculated F is 167.265and the value of F critical at 5% level is 2.78 since F calculated is greater than the F critical (167.265>2.78), this shows that the overall model was significant in explaining the variation in the dependent variable

Table 4.8 ANOVAa

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	89.905	3	29.968	167.265	.000[b]
	Residual	14.333	80	.179		
	Total	104.238	83			

a. Dependent Variable: Supply Chain Performance
b. Predictors: (Constant), Transport Management Systems, Enterprise Resource Planning GPS-Tracking

From the regression findings, the regression equation becomes:

Y= 0.845+ 0.298X1+0.785X2+ 0.22X3 +e

From the findings in the regression analysis, if the factors (, Transport Management Systems, Enterprise Resource Planning, Planning GPS-Tracking and were held constant, supply chain performance of Kenya Medical Supplies Authority. would be at 0.845

A unit increase in Transport Management Systems would lead to an increase in supply chain performance of Kenya Medical Supplies Authority indicated by β1=0.298. p=0.003<0.05, t=3.080 The implication is that a unit increase in Transport Management Systems would led to a significant increase in supply chain performance by β1=0.298 From coefficient results the study found that Enterprise Resource Planning has a significance positive influence on supply chain performance of Kenya Medical Supplies Authority as indicated by β2=0.785 p=0.001<0.05, t=6.852. The implication was that a unit increase in Enterprise Resource Planning would results into increase in supply chain performance of Kenya Medical Supplies Authority β2=0.785.

From the regression coefficient findings, the study revealed that GPS Tracking would have a significant positive influence on procurement supply chain performance as indicated by β3=0.222, p = 0.001<0.05, t=2.339. The implication is that an increase in GPS-Tracking would lead to an increase in supply chain performance of Kenya Medical Supplies Authority. The findings concurred Forslund, (2012) that with Planning GPS-Tracking systems can powerfully complement the facilities provided by these higher level computer systems the focus on an individual node within a wider logistics network allows systems to be highly tailored to the requirements of that node

The model is given as follows;

Table 4.9 Coefficients analysis

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.845	.191		4.434	.000
	TransportManagementSystems	.298	.097	.373	3.080	.003
	Enterprise Resource Planning	.785	.115	.866	6.852	.000
	GPS Tracking	.222	.095	.311	2.339	.001

a. Dependent Variable: Supply Chain Performance
b. Predictors: (Constant), Transport Management Systems, Enterprise Resource Planning, Planning GPS-Tracking

$Y= 0.845+ 0.298X_1+0.785X_2+ 0.22X_3 +e$

Where:-

Y= supply chain performance

β0=constant

Beta coefficients;

X1= Transport Management Systems

X2= Enterprise Resource Planning

X3= Planning GPS-Tracking

X4= Fleet management

ε = Error term.

5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter describes the summary of the study, conclusions and recommendations of the study. The main purpose of the study was to determine the of Effect of lean logistics practices on supply chain performance of Kenya Medical Supplies Authority. The study also determined the influence independent variables on the dependent variable (supply chain performance).

5.2 Summary of the Finding

Logistics Automation

The study also found out that a complete logistics and warehouse automation system drastically reduce the KEMSA workforce required to run a facility, with human input required only for a few tasks, such as picking units of product from a bulk packed case. The assistance is provided with equipment such as pick-to-light units. Smaller systems only are required to handle part of the process. The KEMSA automated storage and retrieval systems, use cranes to store and retrieve identified cases or pallets, typically into a high-bay storage system which would be unfeasible to access using fork-lift trucks or any other means. Logistics automation systems powerfully complement the facilities provided by these higher level computer systems. KEMSA focus on an individual node within a wider logistics network allows systems to be highly tailored to the requirements of that node.

5.3 Conclusion

The study concludes that KEMSA Logistics Automation Logistics automation features such as integration to commodities via your ERP system and access to address book, as well as automatic storage and entry of fuel surcharges and accessories, the systems enabled KEMSA manual data entry errors reduce which will lead to increased shipping costs such as having to pay for shipping twice or paying a higher freight rate due to entering an incorrect commodity freight classification .automation proved to save materials and energy as well as enhance the quality and accuracy of the business processes. This principle also allowed KEMSA to reduce the time they waste on manual tasks as automation can take care of them with higher percentage of accuracy and fewer errors committed. In other words, automation speeds up business processes.

5.4 Recommendations

The study recommends that Automation should give KEMSA a clear visibility of freight rates as well as available modes of transportation. This allowed KEMSA to make strategic decisions over what carrier ships the cargo, the transit time and the rate. In this way, savings can actually be predictable, thus allowing the business to be more deliberate about savings and choices. Automation in logistics offers KEMSA convenience when it comes to cutting down the errors that can hurt the company's pockets.

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