

**SUPPLY CHAIN MANAGEMENT PRACTICES AND PERFORMANCE AT KENYA
MEDICAL SUPPLIES AGENCY**

**BY
SAMUEL KADIVANE KAZI
REG. NO.D61/71232/2008**

SUPERVISOR: MR MICHAEL CHIRCHIR

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DECLARATION

I declare that this research project is my original work and has never been submitted to any other university for assessment or award of a degree.

Signature..... Date.....

SAMUEL KADIVANE KAZI

This project has been submitted with my authority as the university supervisor

Signature..... Date.....

SUPERVISOR: MR MICHAEL K. CHIRCHIR

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ACRONYMS AND ABBREVIATIONS

KEMSA-Kenya Medical Supplies Agency

MOMS -Ministry of Medical Services

MOPHS-Ministry of Public Health and Sanitation

NNPGH-New Nyanza Provincial General Hospital

PPOA -Public Procurement Oversight Authority

SCM -Supply Chain Management

SCOR -Supply Chain Operations Reference

ABSTRACT

During the last 20 years, an era of expanding public health challenges and decreasing resources, the health care industry and the field of supply chain management (SCM) have both experienced significant changes. Health care systems, on a global scale, have due to decreasing resources and increasing demand been forced to find new approaches and concepts in order to improve quality but at the same time lower costs and increase value.

The study aimed at evaluating the supply chain management practices and performance at Kenya Medical Supplies Agency. A case study design was chosen as it enabled the researcher gain an in-depth understanding of the study. The target population of interest in this study consisted of staff members at KEMSA representing the top, middle and low level management. Data analyzed using the Statistical Package for Social Sciences (SPSS) Version 17.0 and presented in the report in the form of tables, bar charts and graphs. The findings revealed that the major challenges that were identified by the respondents include: Poor infrastructure, Bulky materials to be transported and uncertainty in terms of demand. Lack of cold chain maintenance and lack of qualified personnel were considered as the least supply chain management challenges at KEMSA. However, the respondents were not sure on whether special materials to be transported, Poor order request form filling and late arrival of order request form are some of the supply chain management challenges at KEMSA.

The major limitation of this study is that data was collected from a small convenient sample of the staff at KEMSA and hence cannot be generalized to the health sector. A bigger study involving more firms in the sector will have to be done for generalisability.

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CHAPTER ONE: INTRODUCTION

1.1 Background of the study

Supply chain management is becoming a topic high on the international research agenda as well as in practice. New business models based on new ways of designing logistics flows and supply chains have emerged during the past couple of decades. Companies such as Dell and the Spanish apparel retailer Zara are renowned in the global business world for their innovative thinking in logistics and supply chain solutions for reaching their customers. Logistics and logistics innovation are, however, not only about industrial production and products. Recently, firms and organizations from other sectors such as healthcare have started working with practices and programs to increase the flow of “production”. The health care industry is undergoing major revolutions as far as supply chain management management is concerned in both developed and developing countries (Bartlett, 2009; Su et al., 2009).

During the last decade, the health care sector has changed rapidly. Due to increased competition, the growing influence of patient-associations and a necessity to deliver health services in a more efficient and effective way, many health care organizations have started projects in the area of patient logistics, clinical pathways, data interchange and vertical integration (Aptel and Pourjalali, 2001). Moreover, the redesign of hospital services and the implementation of integrated care programmes are frequently addressed as being critical strategies to decrease resource utilization and improve health care quality.

Despite evidence from around the world suggesting that effective quality management practices can lead to improved organisational performance (Ahire et al., 1996; Kumar & Gupta, 1993; Samson & Terziovski, 1999), the importance of quality management to supply chain management is yet to be fully realised. Quality is acknowledged as a critical component in the value-adding process of product creation and delivery. Orders requiring rework have been estimated to cost in excess of eight times the cost of those properly produced and delivered (Bowersox et al., 1985).

Quality management involves being proactive in performing the right activity, the right way the first time, and continuing to perform tasks to the required level. In logistics, this could translate into strategies aiming to make order cycle times shorter and more predictable, as well as maintaining certain levels of in-stock availability and specific fill rates on customer orders. Anderson et al (1998) and Forker et al (1997) demonstrated that a significant relationship exists between level of quality management practices and supply chain operational performance.

Supply chain management in is the backbone of healthcare delivery. This arises from the fact that health care is so dependent on the availability of drugs and other medical supplies at the right time and in the right quantities for the management of patients. Lack of the pharmaceutical product at the point of need often leads to an unnecessary loss of lives which could otherwise have been prevented.

Supply Chain Management (SCM) practices play a major role in the availability of the pharmaceutical and non-pharmaceuticals. This in turn impacts on the performance of the institutions concerned. In Kenya there have been numerous complaints on the non availability of the pharmaceuticals and non-pharmaceuticals that has been largely blamed on KEMSA, the organization mandated to provide these items in government health facilities.

1.1.1 Supply Chain Management in Healthcare in Kenya

Supply chain management in government is guided by the Public Procurement and Disposal Act, 2005 that came into effect in October 2005. In general the user generates a requisition form to request for the item required. The stores then fill in the order if the item is available. If not available the requisition form is forwarded to the medical superintendant who then verifies the availability of funds to purchase the items. This is discussed at the facility procurement committee. Depending on the value of the item, it may be procured directly through cash payment for items whose value is less than Kshs. 10,000 or may require raising of quotations (minimum three quotations) or may require tendering if of higher value or the items may be sourced from KEMSA directly.

The supplier is then notified of the committee's decision and a Local Purchase Order (LPO) is drawn to allow for the supply and to commit the government to pay. The goods are supplied and received by the stores who verify that they are of the correct quantity and quality. Once received they are stored in proper condition and later issued to the department that ordered the goods.

The performance of most public health facilities in supply chain management has been wanting. In a report by the Public Procurement Oversight Authority review of procurement functions and procedures at New Nyanza Provincial General Hospital in 2009 it was found that the NNPGH does not have an internal audit unit. Record keeping, data and documentation controls and contract management is a major challenge. Some records pertaining to execution of procurement process was incomplete. The adverse risks from non compliance with procurement regulations include fraud, corruption and financial loss (PPOA, 2010).

At Thika District Hospital for example, the purchases were found to be uncoordinated and uneconomical without planning of quantities, competitive bidding and scheduling of deliveries. There was lack of adequate storage capacity for pharmaceutical and non-pharmaceuticals leading to undetected deterioration of stores. The capacity of procurement staff in terms of numbers and skills was inadequate and in dire need of strengthening through training (PPOA, 2009).

1.1.2 Kenya Medical Supplies Agency (KEMSA)

KEMSA was established as a state corporation under legal notice No. 17 of 2000. The legal notice outlined three key objects of KEMSA to include:

- i) Develop and operate a viable commercial service for the procurement and sale of drugs and other medical supplies;
- ii) Provide a secure source of drugs and other medical supplies for Public Health institutions; and
- iii) Advise the Health Management Boards and the general public on matters related to the procurement, cost effectiveness and rational use of drugs and other medical supplies.

KEMSA' core functions include procurement, warehousing and distribution of medical supplies. In performing these functions, KEMSA's mission is "to improve the healthcare of Kenyans through efficient procurement and reliable distribution of quality medical commodities and promotion of rational drug use and practices. KEMSA vision is "to be the leading supplier of

quality and affordable essential medical commodities to health facilities in Kenya.” Both KEMSA’s mission and vision statements support the Ministry of Medical Services and Ministry of Public Health & Sanitation.

The Kenya Medical Supplies Agency (KEMSA) is a specialised medical logistics provider for Ministries of Medical Services/Public Health and Sanitation-supported health facilities and programmes. KEMSA works to support the National Health Strategic Plan and the Kenya Health Package for Health in providing public health facilities with the “right quantity and quality of drugs and medical supplies” at the best market value. KEMSA’s overall mandate is to procure, warehouse and distribute medical commodities to public health facilities operated by the Ministry of Medical Services and the Ministry of Public Health and Sanitation.

To effectively deliver on the mandate, KEMSA carries out the following core functions that underpin its Business Priorities: Procurement: A mainstay function, procurement’s task is to source efficacious drugs and medical commodities at verifiable value-for-money prices for the tax-paying public. Our procurement procedures are guided the Public Procurement Regulations. KEMSA was created purposely to provide institutional framework for sourcing medical supplies centrally in order to ensure quality and economies of scale.

Warehousing: Integrity of medical commodities requires more than just a roof over an open space in a four-wall enclosure. The specialised nature of drugs and medical commodities call for state-of-the-art racking schemes that facilitate ease of storage and stock retrieval procedures. Storage conditions for drugs and medicines vary from product to product in terms of lighting, temperatures and humidity, conditions that KEMSA warehouses throughout the country fulfil. Warehousing activities are also conducted to ensure the highest health and safety standards.

Distribution & Customer Service: Customer Service Centres are conveniently located in Nairobi, Mombasa, Kisumu, Nakuru, Eldoret, Kakamega, Nyeri and Garissa. Manned by competent Regional Liaison Officers, the regional customer service teams work closely with health facilities to identify, quantify and make requisitions for essential drugs and medical commodities on behalf of clients. Over and above ensuring sustainable stock levels of essential

drugs and medical commodities, the regional liaison teams are also responsible for sensitizing health practitioners and the public on rational drug use.

1.2 Statement of the problem

Although many health care organizations have recognized the importance of adopting supply chain management practices, the application of techniques, methods and best practices originally developed in an industrial setting clearly is often problematic. Organizations even with most efficient internal processes do not facilitate supply chain management across borders. Collaboration is minimized and other players resort to traditional methods of operations that may not be cost effective (Muturi, 2010).

Supply chain management practices and innovation have been found to positively influence supply chain performance as well as the overall performance of the organizations (Ling and Ling, 2012). In his study, Hassan (2012) asserts that supply chain management practices in humanitarian organizations are critical for the performance of the organizations as the speed at which humanitarian aid is delivered at the point of need.

KEMSA is the organization that has been mandated to carry out the procurement function for the ministries of health. There have been numerous complaints from the public health facilities regarding erratic supplies of the essential drugs and other medical supplies (MOMS, 2008).

This study aimed to explore the SCM practices at KEMSA, the effects of these on performance of the supply chain at KEMSA and the challenges that the organization faces in supply chain management. The study aims to answer the questions: what are the supply chain practices in KEMSA? What is the effect of these SCM practices on the performance of KEMSA? What are the challenges of SCM in KEMSA?

1.3 Study objectives

The study had the following specific objectives:

- 1 To establish the supply chain practices in KEMSA.

- 2 To determine the effect of supply chain practices on the performance of the supply chain at KEMSA.
- 3 To determine the challenges of supply chain management at KEMSA

1.4 Value of the study

The findings of the study is expected to assist the management of KEMSA to address the shortcomings in its service delivery; challenges experienced in the supply of health care commodities, and provide guidance in the up scaling of its activities for enhanced service delivery.

Policy makers such as the government may find the study invaluable in the implementation of policies aimed at achieving effective supply chain management in public organizations. The policy makers may also obtain knowledge of supply chain management dynamics and the responses that are appropriate and specific for both governmental and non-governmental organizations, they may therefore obtained guidance from this study in designing appropriate policies that can ensure effective logistics management especially in the health and medical sector.

The study may also be useful to scholars and academicians. It may provide information to potential and current scholars on supply chain management in various organizations and those who wish to use the findings as a basis for further research on supply chain management implementation both in the public and private sector.

CHAPTER TWO: LITERATURE REVIEW

2.1 Supply Chain Management

A Supply Chain encompasses all activities in fulfilling customer demands and requests. These activities are associated with the flow and transformation of goods from the raw materials stage, through to the end user, as well as the associated information and funds flows. There are four stages in a supply chain: the supply network, the internal supply chain (which are manufacturing plants), distribution systems, and the end users. Moving up and down the stages are the four flows: material flow, service flow, information flow and funds flow (Piu, 1999). Supply Chain Management (SCM) is the management of a network of interconnected businesses involved in the ultimate provision of product and service packages required by end customers. Supply Chain Management spans all movement and storage of raw materials, work-in-process inventory, and finished goods from point of origin to point of consumption (Hines, 2004). Lambert (2001) affirms that supply chain management involves the design, planning, execution, control, and monitoring of supply chain activities with the objective of creating net value, building a competitive infrastructure, leveraging worldwide logistics, synchronizing supply with demand and measuring performance globally.

Chan (2003) asserts that supply chain management is a set of synchronized decisions and activities utilized to efficiently integrate suppliers, manufacturers, warehouses, transporters, retailers, and customers so that the right product or service is distributed at the right quantities, to the right locations, and at the right time, to minimize system-wide costs while satisfying customer service level requirements. The objective of Supply Chain Management (SCM) is to achieve sustainable competitive advantage.

Supply chain management is a cross-function approach including managing the movement of raw materials into an organization, certain aspects of the internal processing of materials into finished goods, and the movement of finished goods out of the organization and toward the end-consumer. As organizations strive to focus on core competencies and becoming more flexible, they reduce their ownership of raw materials sources and distribution channels. These functions are increasingly being outsourced to other entities that can perform the activities better or more

cost effectively. The effect is to increase the number of organizations involved in satisfying customer demand, while reducing management control of daily logistics operations. Less control and more supply chain partners led to the creation of supply chain management concepts. The purpose of supply chain management is to improve trust and collaboration among supply chain partners, thus improving inventory visibility and the velocity of inventory movement (Boversox, 2002).

2.2 Supply Chain Management (SCM) Practices

SCM practices involve a set of activities undertaken in an organization to promote effective management of its supply chain (Koh et al., 2007). SCM practices can be defined in various ways. Donlon (1996) coined SCM practices as practices that include supplier partnership, outsourcing, cycle-time compression, continuous process flow and information technology sharing. Li et al. (2005) defined SCM practices as the set of activities that organizations undertake to promote effective management of the supply chain. Otto and Kotzab (2003) termed SCM practice as a special form of strategic partnership between retailers and suppliers.

Alvarodo and Kotzab (2001) viewed SCM practices in terms of reducing duplication effects by focusing on core competencies and using inter-organizational standards such as activity-based costing or electronic data interchange, and eliminating unnecessary inventory level by postponing customizations towards the end of the supply chain. Koh et al. (2007) categorized SCM practices from the following aspects: close partnership with suppliers, close partnership with customers, just-in-time supply, strategic planning supply chain benchmarking, few suppliers, holding safety stock and sub-contracting, e-procurement, outsourcing and many suppliers. Ellram, Tate and Billington (2007) identified seven theoretical processes of service supply chains which include information flow, capacity and skills management, demand management, customer relationship management, supplier relationship management, service delivery management and cash flow.

In general, SCM practices are categorized into demand management, customer relationship management, supplier relationship management, capacity and resource management, service performance, information and technology management, service supply chain finance, and order process management (Chong, et al., 2010).

Literature review indicates that the shortcoming of previous studies on SCM relates to their focus on general forms of SCM that are applicable across different type of organizations. This warrants for further research into the service industry's SCM practices by focusing on public healthcare in Kenya. In this regard, this study the SCM practices that are suitable to public healthcare are namely information and technology management, demand management, customer relationship management, supplier relationship management, capacity and resource management.

2.3 Medical supply chains

Similar to supply chain management in a manufacturing setting, health supply chains can be characterized by different modes of integration: Integration and co-ordination of processes; integration and co-ordination of information flows; integration and co-ordination of planning processes; integration of intra- and inter-organisational processes; integration of market-approach; integration of market-development (Lowell & Celler, 1998).

Related to health service providers, supply chain management often refers to the information, supplies and finances involved with the acquisition and movement of goods and services from the supplier to the end user in order to enhance clinical outcomes while controlling costs. In doing so supply chain management puts a strong emphasis on the integration of processes. Within the healthcare sector these processes might refer to physical products like pharmaceuticals, medical devices and health aids but also to processes associated with the flow of patients. In both cases the basic rationale of a supply chain management approach is founded in the belief that intensive co-ordination and integration between operational processes might lead to a better health supply chain performance (McCutcheon & Stuart, 2000).

Information technology and the deployment of e-business clearly are closely linked to the co-ordination and integration of operational processes. Many studies have advocated the important role information technology plays in supply chain practices (Breen & Crawford, 2005; Harland & Caldwell, 2007) and it will be of no surprise therefore that many studies on health care supply chains focus on the role of e-business technologies across hospital supply chains (Siau et al., 2002).

Similar to the co-ordination and integration of operational processes, information technology in the health sector is related to both physical products as well as to the flow of patients within and between health service organizations (Lowell & Celler, 1998). Examples of information technology-oriented applications can be found in the area of procurement, inventory control and materials planning. The application of electronic patient record systems is also a well known example of integrated information-technology being implemented in health systems across the world. Although many studies have reported important problems when implementing Electronic Patient Record systems (Boonstra & Govers, 2009), it is widely acknowledged that patient related information systems can significantly contribute to improving the integration and smoothing of processes within and between health service delivery organisations.

Clearly, many different stakeholders are involved in health care supply chain practices. Therefore, the application of supply chain management practices in a health care setting is almost by definition related to organisational aspects like building relationships, allocating authorities and responsibilities, and organizing interface processes. Different studies have highlighted the importance of organisational processes when applying supply chain management practices. Moreover, recent studies reveal that elements like organisational culture, the absence of strong leadership and mandating authority, as well as power and interest relationships between stakeholders might severely hinder the integration and co-ordination of processes along the health care supply chain (McCutcheon & Stuart, 2000).

Health care supply chain integration not only relates to the integration and co-ordination of planning processes but can also be linked to joint “market development” and offering new “care-products”. Within the automotive industry it is common practice that supply chain partners

collaborate in the process of developing new products. Product co-development is a recognized phenomenon in the field of supply chain management and within industrial supply chains many joint efforts are made to develop new products across suppliers, customers and organisational units. It is interesting to note that the same development is visible in the area of health care supply chains.

Although less common, examples can be found of health care service providers communicating jointly to patient groups about the services they provide. In doing so, they emphasize the benefits of the intensive collaboration between the health care organisations for clients in terms of throughput time, quality of care and the services being provided. Additionally, care providers have taken the initiative in different countries to develop new care-products in close collaboration with each other. In The Netherlands for instance, several hospitals started up joint centres for haemodialysis. Other examples can be found in the field of Breast centres. Clearly, the above mentioned modes of integration cannot be considered in isolation. Studies in the field of industrial companies indicate that organizations often go through several stages of integration, starting with a transparency stage via a commitment/coordination stage to a full integrated stage encompassing all the different modes of integration addressed above (Ballou et al., 2000; van der Vaart & van Donk, 2008).

The ongoing transformation within the health care sector towards greater integration and more process oriented health care chains requires a shift in strategy, structure and control mechanisms. As such, the supply chain orientation within the health care sector can be regarded as a complex social change process.

2.4 Supply chain performance

Performance of supply chains has been defined by several authors differently. Kwai et al (2004) for instance looked at it from three perspectives delivery times, consumer satisfaction and cost reduction.

The supply chain operations reference (SCOR) model has five attributes:

1. Supply chain delivery reliability
2. Supply chain responsiveness
3. Supply chain flexibility
4. Supply chain costs and
5. Supply chain asset management efficiency (Horatiu et al, 2012)

Table 2.1 SCOR model performance attributes and associated metrics.

| Performance attribute | Performance attribute definition | Metric |
|-----------------------------------|--|--|
| Supply chain delivery reliability | The performance of the supply chain in delivering the correct product, to the correct place, at the correct condition and packaging in the correct quantity, with the correct documentation, to the correct customer | Delivery performance Perfect order fulfillment Line item fill rate |
| Supply chain responsiveness | The velocity at which a supply chain provides products to the customer | Order fulfillment lead time |
| Supply chain flexibility | The agility of a supply in responding to marketplace changes to gain or maintain competitive advantage | Supply chain response time Production flexibility |
| Supply chain costs | The costs associated with operating the supply chain | Cost of goods sold Total supply chain management costs Value added productivity Warranty/returns processing costs |
| Supply chain asset | The effectiveness of an organization in | Cash to cash cycle |

| | | |
|-----------------------|--|---|
| management efficiency | managing assets to support demand satisfaction. This includes the management of all assets: fixed and working capital | time Inventory days of supply Asset turns |
|-----------------------|--|---|

Source: Supply-Chain Council (2003, p. 7)

2.5 Challenges for Supply Chain management

In a Hong Kong study, Ching et al (2004) the barriers to SCM implementation include a lack of top management commitment and lack of training for personnel in SCM, poor budgetary allocation and resistance to information sharing have also been noted as some of the challenges that have affected the development of SCM.

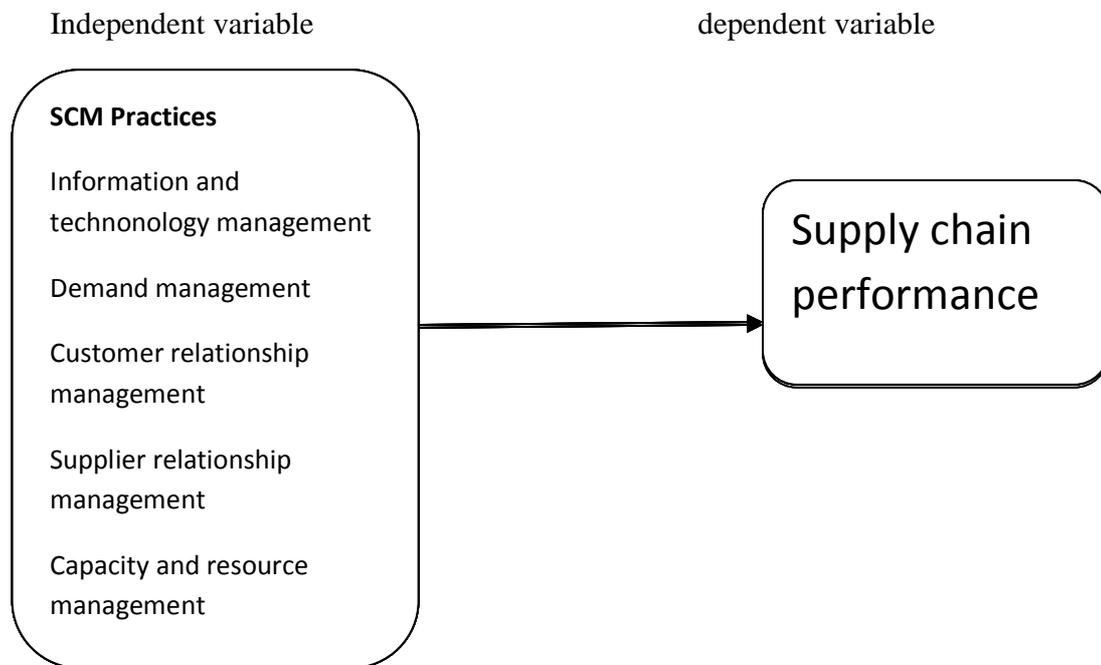
The government should establish SCM expert training units to provide the experts, improve the communication of ports and airports and extend the working hours of the customs and excise department to satisfy SCM needs (Kwai et al, 2004).

Other challenges include poor infrastructure, bulky materials to be transported, poor planning special materials to be transported, poor order request form filling and late arrival of order request form (Hassan, 2012).

2.6 Summary of literature review

The literature review has revealed that the most significant SCM practices are information and technology management, demand management, customer relationship management, supplier relationship management and capacity and resource management in the SCM. There are limited studies on SCM in healthcare and the performance of SCM in healthcare. Thus there exists a knowledge gap on this particularly so in Kenya.

2.7 Conceptual framework



The independent variables are the supply chain practices which include information and technology management, demand management, customer relationship management, supplier relationship management and capacity and resource management have an impact on the supply chain performance which is the dependent variable.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This chapter specifies the nature of the research design and the population studied. The chapter describes the following: research design, target population, data collection techniques and data analysis methods that will be followed in the research process.

3.2 Research Design

In this study, a case study design was adopted. It sought to evaluate SCM practices at Kenya Medical Supplies Agency (KEMSA), the sole government agency mandated to supply pharmaceuticals and non pharmaceuticals to the health facilities. A case study was chosen as it enabled the researcher gain an in-depth understanding of the study. Kenneth (2004) observes that a case study is most appropriate where a detailed analysis of a single unit of study is desired as it provides focused and detailed insight to phenomenon that may otherwise be unclear.

3.3 Population of study and sampling

The target population of interest in this study consisted of staff members at KEMSA representing the top, middle and low level management.

3.4 Data Collection

The main instrument for data collection was a structured questionnaire that allowed for uniformity of responses to questions. The questionnaire is a fast way of obtaining data as compared to other instruments (Mugenda & Mugenda, 2003). Questionnaires give the researcher comprehensive data on a wide range of factors. Questionnaires allowed greater uniformity in the way questions are asked, ensuring greater compatibility in the responses. A five point non-comparative Likert scale was used for the closed ended questions. Likert scale was simple to construct, and was easy for the respondents to read, understand and respond appropriately to the statements put across. The Likert scale also enhanced the production of highly accurate results during analysis.

The questionnaire was divided into four parts: Part A covers demographic profile, part B deals with supply chain management practices, part C deals with performance of the supply chain and part D entails the challenges faced by KEMSA in supply chain management. Primary data was

used. The researcher interviewed top, middle and low level management and to ensure a broad perspective on SCM by the different management levels in the entire KEMSA.

3.5 Data Analysis

A comparison of data collected with theoretical approaches and documentaries cited in the literature review was done. Further, data obtained from various respondents was compared against each other in order to get more relevant on the issues under study. Data was checked for completeness, accuracy, errors in responses, omissions and other inconsistencies. The data was then coded using numerals in order to put them in limited number of categories.

Data on supply chain practices was ranked while data on effect of the practices on performance was analyzed by correlation and challenges were described and ranked. The researcher performed a regression analysis to establish the association between the independent variables with the dependent variable.

The regression model was as follows:

$$y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon$$

Where:

y = Supply chain performance

β_0 = Constant Term

β_1 = Beta coefficients

X_1 = Information and technology management

X_2 = Demand management

X_3 = Customer relationship management

X_4 = Supplier relationship management

X_5 = Capacity and resource management

ϵ = Error in the model

The data was then analyzed using the Statistical Package for Social Sciences (SPSS) Version 17.0 and presented in the report in the form of tables, bar charts and graphs.

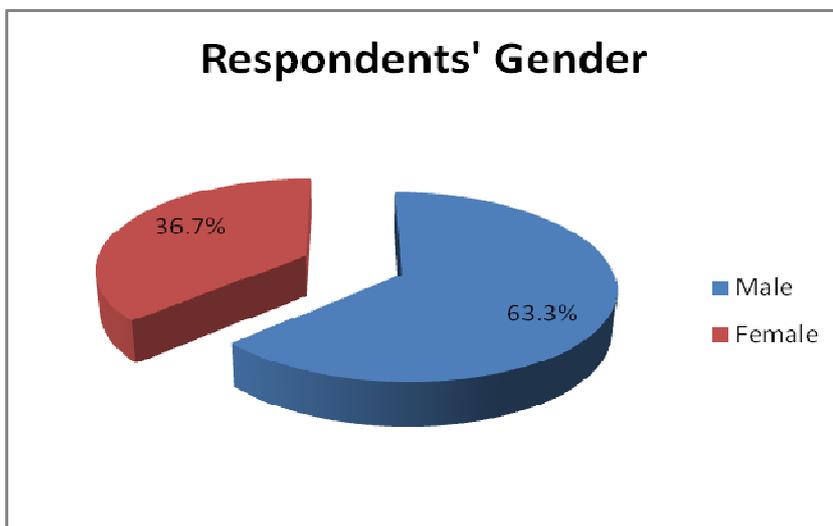
CHAPTER FOUR: DATA ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter presents the quantitative analysis of data collected from the employee at Kenya Medical Supplies Agency. It gives the findings from the questionnaires and other observations that were encountered during the fieldwork. The data has been categorically analyzed to give clear and vivid findings of the study. The study targeted top, middle and low level managers at the organization. The study targeted a total of 42 top, middle and low level managers at KEMSA, there was 74% response rate since 31 respondents filled and returned the questionnaires.

4.2 Demographic Information of the Respondents

Figure 4.1: Respondents Gender



The researcher sought to determine the ages of the respondents, from the findings on figure 4.1, 63.3% are male while 36.7% are female implying that the gender distribution of employees at Kenya Medical Supplies Agency is not balanced.

Table 4.1: Ages of the Respondents

| Age Bracket | F | % |
|--------------------|-----------|--------------|
| 18- 24 years | 2 | 6.5 |
| 25-34 years | 17 | 54.8 |
| 35-44 years | 5 | 16.1 |
| 45-54 years | 6 | 19.4 |
| Over 50 years | 1 | 3.2 |
| Total | 31 | 100.0 |

Findings on Table 4.1 revealed that majority of the respondents 16(53.3%) were aged between 25-34 years, 6(20.0%) between 45-54 years and 5(16.7%) between 35-44 years. This shows that majority of the respondents were mature with appropriate work experience and therefore they were well versed with relevant information on supply chain management which was needed for the study.

Table 4.2: Respondents' Education level

| Age Bracket | F | % |
|------------------|-----------|--------------|
| Diploma | 7 | 22.6 |
| Bachelors Degree | 16 | 51.6 |
| Master Degree | 8 | 16.7 |
| PHD | 0 | 25.8 |
| Total | 31 | 100.0 |

Findings on table 4.2 reveal that a greater proportion of the respondents 16(51.6%) had Bachelors degree,8(16.7%) had Master Degrees, this suggests that the respondents were well conversant with the issues relating to Supply chain management practices in the health sector and therefore they gave accurate and relevant information needed for the study.

Figure 4.2: Work experience of the respondents



The Findings on figure 4.2 reveal that majority of the respondents (60.0%) have worked at Kenya Medical Supplies Agency for a period of 6-10 years, while 20.0% have worked for 11-15 years, this implies that the respondents were well conversant with the supply chain procedures at the supermarket and therefore they gave the correct and accurate information the researcher needed for needed for the study.

Figure 4.3: Level of Management

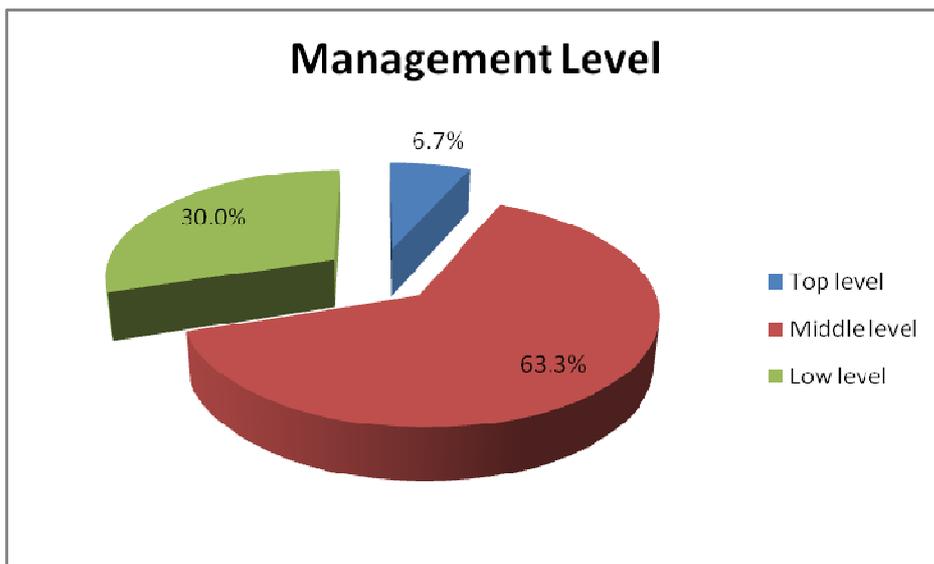


Figure 4.3 indicates that majority of the respondents (63.3%) were falling in the middle level management category, 30.0% in the low level management while only 6.7% represented the top management. This suggests that the personnel involved in the supply chain visibility at Kenya Medical Supplies Agency are mainly in the middle management level.

4.3. Supply Chain management at KEMSA

Table 4.4: Supplied chain management practices at KEMSA

| <i>The following supply chain management practices are practiced at KEMSA :</i> | Mean | Standard Deviation | N |
|---|-------------|---------------------------|----------|
| We are proactive and systematic in the supply chain | 3.342 | 0.785 | 31 |
| Track and trace products in the supply chain | 4.431 | 0.563 | 31 |
| Alert customers on product availability | 2.463 | 0.784 | 31 |
| Alert customers on status of shipment | 2.641 | 1.045 | 31 |
| Timely delivery | 4.732 | 0.243 | 31 |
| Reduce lead time | 4.678 | 0.831 | 31 |
| Alert customers on late shipment | 3.234 | 1.763 | 31 |
| Monitor carrier's activities | 4.542 | 0.634 | 31 |
| Monitor regulatory and security issues | 4.605 | 0.843 | 31 |
| Making mid-course corrections | 2.478 | 0.753 | 31 |

The researcher sought to establish the supply chain management practices that have been put in place at KEMSA, the respondents were instructed to respond to the statements on a 5 point Likert scale and indicate the extent they agree with the statements that is: 5-Strongly agree, 4-Agree, 3-Not Sure, 2-Disagree, 1-Strongly disagree. A mean (M) score of 0-1.5 means that the respondents strongly disagreed, between 1.50 to 2.50 means they disagreed, 2.50 to 3.50 means the respondents were not sure, 3.50-4.50 means they agreed, and a mean above 4.50 means the respondents strongly agreed. Based on the findings on table 4.4, the supply management that

have been put in place by KEMSA include: Timely delivery (M=4.732; SD=0.243), Reducing lead time (SD=4.678;SD=0.831), Monitoring regulatory and security issues (M=4.605;SD=0.843); Monitoring carrier’s activities (M=4.542;SD=0.634).These practices had mean scores greater the 4.5 and therefore the respondents strongly agreed with them as being the management practices at KEMSA. However, the respondents agreed that KEMSA tracks and traces products in the supply chain (M=4.431;SD=0.563).The supply chain management practices that are least practiced at KEMSA include: Alerting customers on status of shipment(M=2.441;SD=1.045), Making mid-course corrections(M=2.478;SD=0.753).The mean scores for these practices were below 2.50 and therefore the respondents disagreed with them.

Table 4.5: The results of supply chain management

| <i>Supply chain management has led to:</i> | Mean | Standard Deviation | N |
|--|-------------|---------------------------|----------|
| Timely delivery of pharmaceuticals and non pharmaceuticals | 4.452 | 0.674 | 31 |
| Perfect order fulfillment | 4.870 | 1.245 | 31 |
| Good line item fill rate | 3.542 | 0.973 | 31 |
| Lower order fulfillment lead-time | 3.785 | 1.872 | 31 |
| Faster supply chain response time | 3.945 | 0.892 | 31 |
| Faster response to customer complaints | 2.484 | 0.565 | 31 |
| Lower cost of goods sold | 2.456 | 0.784 | 31 |
| Value added productivity | 3.892 | 0.784 | 31 |
| Reduced returns processing costs | 3.874 | 1.234 | 31 |
| Faster cash to cash cycles | 4.630 | 1.345 | 31 |
| Lower inventory days of supply | 4.756 | 0.564 | 31 |

The researcher sought to examine the results of supply management practices at KEMSA, the respondents were instructed to respond to the statements on a 5 point Likert scale and indicate the extent they agree with the statements that is: 5-Strongly agree, 4-Agree, 3-Not Sure, 2-

Disagree, 1-Strongly disagree. A mean (M) score of 0-1.5 means that the respondents strongly disagreed, between 1.50 to 2.50 means they disagreed, 2.50 to 3.50 means the respondents were not sure, 3.50-4.50 means they agreed, and a mean above 4.50 means the respondents strongly agreed. Based on the findings on table 4.5, supply chain management at KEMSA has led to: Perfect order fulfillment(M=4.870;SD=1.245); Lower inventory days of supply(M=4.756;SD=0.564), faster cash to cash cycles(M=4.630;SD=1.345), and faster supply chain response time(M=3.945;SD=0.892). The respondents however disagreed that supply chain management has led to: Faster response to customer complaints(M=2.484;SD=0.565), and lower cost of goods sold(M=2.456;SD=0.784).

Table 4.6: Supply chain management challenges faced by KEMSA

| <i>Supply chain management challenges faced by KEMSA include:</i> | Mean | Standard Deviation | N |
|---|-------------|---------------------------|----------|
| Poor infrastructure | 4.765 | 0.943 | 31 |
| Bulky materials to be transported | 4.604 | 0.831 | 31 |
| Lack of financial resources | 4.234 | 0.954 | 31 |
| Lack of proper planning | 4.125 | 1.945 | 31 |
| Special materials to be transported | 3.442 | 1.053 | 31 |
| Uncertainty in terms of demand | 4.784 | 0.564 | 31 |
| Uncertainty in terms of supplies | 4.561 | 0.763 | 31 |
| Lack of cold chain maintenance | 2.432 | 0.673 | 31 |
| Poor order request form filling | 3.423 | 0.645 | 31 |
| Late arrival of order request form | 3.417 | 0.784 | 31 |
| Lack of qualified personnel | 2.275 | 0.674 | 31 |

The researcher further sought to establish the supply management challenges at KEMSA, the respondents were instructed to respond to the statements on a 5 point Likert scale and indicate the extent they agree with the statements that is: 5-Strongly agree, 4-Agree, 3-Not Sure, 2-Disagree, 1-Strongly disagree. From the findings on table 4.6, the major challenges that were identified by the respondents include: Poor infrastructure (M=4.765; SD=0.943), Bulky materials to be transported (M=4.604; 0.803) and uncertainty in terms of demand(M=4.784;SD=0.564). Lack of cold chain maintenance (M=2.432;SD=0.673), lack of qualified personnel(M=2.275;SD=0.674) were considered as the least supply chain management challenges at KEMSA. However, the respondents were not sure on whether special materials to be transported (M=3.442; SD=1.053), Poor order request form filling (M=3.423; SD=0.645) and late arrival of order request form(M=3.417;SD=0.784) are some of the supply chain management challenges at KEMSA.

4.4 Regression analysis

The researcher performed a regression analysis to establish the association between the independent variables with the dependent variable.

The regression model was as follows:

$$y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e$$

Where:

y = Supply chain performance

β_0 = Constant Term

β_1 = Beta coefficients

X_1 = Information and technology management

X_2 = Demand management

X_3 = Customer relationship management

X_4 = Supplier relationship management

X_5 = Capacity and resource management

ϵ =Error in the model

4.5. Strength of the model

Analysis in table 4.7 shows that the coefficient of determination (the percentage variation in the dependent variable being explained by the changes in the independent variables) R^2 equals 0.843, that is, Information and technology management, Demand management, Customer relationship management, Supplier relationship management, Capacity and resource management leaving only 15.7 percent unexplained. The P- value of 0.000 (Less than 0.05) implies that the model of supply chain performance is significant at the 5 percent level of significance.

Table 4.7: Model Summary

ANOVA^b

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|-------|------------|----------------|----|-------------|--------|-------------------|
| 1 | Regression | 93.144 | 4 | 23.286 | 79.730 | .000 ^a |
| | Residual | 53.739 | 56 | .292 | | |
| | Total | 146.884 | 60 | | | |

a. Predictors: (Constant), Information and technology management Demand management Customer relationship management Supplier relationship management Capacity and resource management

b. Dependent Variable: Supply chain performance.

Source: Research data 2012

ANOVA findings (P- value of 0.00) in table 4.8 show that there is correlation between the predictor's variables (Information and technology management, Demand management, Customer relationship management, Supplier relationship management ,Capacity and resource management) and response variable (Supply chain performance). An F ratio is calculated which represents the variance between the groups, divided by the variance within the groups. A large F ratio indicates that there is more variability between the groups (caused by the independent variable) than there is within each group, referred to as the error term.

Table 4.8: Coefficients of regression equation

Coefficients^a

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---------------------------------------|-----------------------------|------------|---------------------------|-------|------|
| | B | Std. Error | Beta | | |
| 1 (Constant) | .240 | .258 | | .930 | .354 |
| Information and technology management | .294 | .077 | .297 | 3.798 | .000 |
| Demand management | .230 | .070 | .188 | 3.290 | .001 |
| Customer relationship management | .013 | .062 | .013 | .215 | .001 |
| Supplier relationship management | .421 | .077 | .406 | 5.445 | .000 |
| Capacity and resource management | .394 | .083 | .245 | .976 | .002 |

Coefficients^a

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|-------|---------------------------------------|-----------------------------|------------|---------------------------|-------|------|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | .240 | .258 | | .930 | .354 |
| | Information and technology management | .294 | .077 | .297 | 3.798 | .000 |
| | Demand management | .230 | .070 | .188 | 3.290 | .001 |
| | Customer relationship management | .013 | .062 | .013 | .215 | .001 |
| | Supplier relationship management | .421 | .077 | .406 | 5.445 | .000 |
| | Capacity and resource management | .394 | .083 | .245 | .976 | .002 |

a. Dependent Variable: Supply chain performance

Source: Research data 2012

The established multiple linear regression equation becomes:

$$Y = 0.240 + 0.294X_1 + 0.230X_2 + 0.013X_3 + 0.421X_4 + 0.394X_5$$

Where:

Constant = 0.240, shows that if Information and technology management, Demand management, Customer relationship management, Supplier relationship management, Capacity and resource management all rated as zero, supply chain performance would be 0.240

X₁= 0.294, shows that one unit change in Information and technology management results in 0.294 units increase in supply chain performance.

$X_2 = 0.230$, shows that one unit change in Demand management results in 0.230 units increase in supply chain performance.

$X_3 = 0.013$, shows that one unit change in Customer relationship management results in 0.013 units increase in supply chain performance.

$X_4 = 0.421$, shows that one unit change in Supplier relationship management results in 0.421 units increase in supply chain performance.

$X_5 = 0.394$, shows that one unit change in resource management results in 0.421 units increase in supply chain performance.

4.9. Correlation Coefficients

| Supply chain management practices | | Supply Chain Performance |
|--|---------------------|--------------------------|
| Proactive in the supply chain | Pearson Correlation | 0.398* |
| | Sig. (2-tailed) | 0.023 |
| | N | 31 |
| Track and trace products in the supply chain | Pearson Correlation | 0.944 |
| | Sig. (2-tailed) | 0.674 |
| | N | 31 |
| Alert customers on product availability | Pearson Correlation | 0.783** |
| | Sig. (2-tailed) | 0.784 |
| | N | 31 |
| Alert customers on status of shipment | Pearson Correlation | -0.674* |
| | Sig. (2-tailed) | 0.182 |
| | N | 31 |
| Timely delivery | Pearson Correlation | 0.776* |
| | Sig. (2-tailed) | 0.182 |
| | N | 31 |
| Reduce lead time | Pearson Correlation | 0.894** |
| | Sig. (2-tailed) | 0.182 |
| | N | 31 |
| Alert customers on late shipment | Pearson Correlation | 0.470* |
| | Sig. (2-tailed) | 0.182 |
| | N | 31 |

| | | |
|--|---------------------|---------|
| Monitor carriers activities | Pearson Correlation | 0.873** |
| | Sig. (2-tailed) | 0.182 |
| | N | 31 |
| Monitor regulatory and security issues | Pearson Correlation | 0.634** |
| | Sig. (2-tailed) | 0.182 |
| | N | 31 |
| Ability to make mid-course corrections | Pearson Correlation | 0.572* |
| | Sig. (2-tailed) | 0.182 |
| | N | 31 |

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

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

The correlation analysis produced in table 4.9 shows that a statistically significant high negative correlation was observed between alerting customers on status of shipment and supply chain performance. Positive correlation to the supply chain performance was observed between the following supply chain practices: Tracking and trace products in the supply chain, alerting customers on product availability, timely delivery and reducing the lead time. The findings therefore imply that these are the major supply chain practices that highly impact on the supply chain performance.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter provides a discussion of the findings reported in chapter four, the conclusions of the study are drawn and recommendations made. The chapter also suggests areas for further research.

5.2 Summary of the findings

The results of the study provide important insights on supply chain management practices in the health care sector and their effect on performance. Innovative design of a SC has a significant impact on the selection of and cooperation with best suppliers, increase of SC efficiency, and enhancement of supply chain management practice, which subsequently improves organizational performance. The findings of the study suggests that the supply chain management practices that have been put in place at KEMSA include: Timely delivery(M=4.732; SD=0.243), Reducing lead time (SD=4.678;SD=0.831), Monitoring regulatory and security issues (M=4.605;SD=0.843); Monitoring carrier's activities (M=4.542;SD=0.634).Supply chain management at KEMSA has led to: Perfect order fulfillment(M=4.870;SD=1.245); Lower inventory days of supply(M=4.756;SD=0.564),faster cash to cash cycles(M=4.630;SD=1.345), and faster supply chain response time(M=3.945;SD=0.892).The results imply that prior to implementing SCM, supply chain managers need to implement innovative ideas that can streamline their operational processes including those of suppliers.

The major challenges that were identified by the respondents include: Poor infrastructure (M=4.765; SD=0.943), Bulky materials to be transported (M=4.604; 0.803) and uncertainty in terms of demand (M=4.784;SD=0.564). Lack of cold chain maintenance (M=2.432; SD=0.673), lack of qualified personnel (M=2.275;SD=0.674) were considered as the least supply chain management challenges at KEMSA. However, the respondents were not sure on whether special materials to be transported (M=3.442; SD=1.053), Poor order request form filling (M=3.423;SD=0.645) and late arrival of order request form(M=3.417;SD=0.784) are some of the supply chain management challenges at KEMSA.

The findings revealed that the major supply chain practices that highly impact on the supply chain performance include: Tracking and trace products in the supply chain, alerting customers on product availability, timely delivery and reducing the lead time. Alerting customers on status of shipment was however seen as the least practice that influences the performance of supply chain.

5.3 Conclusions

Supply chain management practices in the healthcare sector are designed to include best practices of the sector to streamline entire processes from the ordering to supply through delivery processes. These processes encompass efficient management and distribution for the flow of products for on time delivery of high-quality medical care.

The findings suggested that effective SCM impact positively on the operational performance as a whole and all the competitive priorities, providing support for the cumulative capabilities perspective at KEMSA. The study also established that encouraging evidence for an operational competence construct, mediating the relationship between SCM and the several dimensions of operational performance. This operational competence is influenced by SCM, but also by other factors. Drawing from the resource-based view, it can be thought to be an encompassing resource summarizing the impacts of several operational initiatives.

The major supply chain management challenges faced in the health sector include poor infrastructure, bulky materials to be transported and uncertainty in terms of demand. Lack of cold chain maintenance and qualified personnel were also considered as supply chain management challenges at KEMSA. The findings imply that KEMSA as an organization has not been able put in place effective supply chain management practices that can improve the overall performance of its supply chain.

This study contributes useful information to organizational leaders and managers in the healthcare sector, as the results suggest that successful implementation of supply chain management practices contribute to perfect order fulfillment, lower inventory days of supply, faster cash to cash cycle and faster supply chain response time. To achieve supply chain performance, managers must nurture an excellent work environment, which includes providing

right resources to support efficient operational processes for high quality of care and reduced medical errors at the lowest cost or highest level of efficiency.

5.4 Recommendations

The healthcare organizations should focus on innovating and developing the overall business strategy (for example investigate the applicability of new technologies and resources in SCM) to enhance competitive advantage. The importance of innovative SCM practices eliminate unnecessary cost, accelerating financial returns and streamlining SC processes in the healthcare industry.

In order to ensure cost reduction and improve organizational performance in SCM, organizations and suppliers in the health care sector should try to have a positive relationship and devise approaches to collaboratively solve supply chain challenges in order to improve on efficiency. As a result, the collaborative strategy will provide competitive advantage to both organizations and suppliers in the sector. To improve quality in SCM, organizations such as KEMSA should create good partnerships with all players in the healthcare sector in order to improve supply chain management.

In addition, health care organizations should categorize the SC activities to standardize needed materials to ensure a lean SC which can provide the highest quality of care at the lowest possible cost. It is important to ensure that medical practitioners with experience in supply chain management participate in the material standardization efforts. Organizations such as KEMSA also need to analyze the impact of each supply chain management practice they put in place and the impact on supply chain management.

Information gathering and processing should be improved in the supply chain. This concerns both the availability of records of customers and information on provider performance. Dissemination of information in the healthcare sector is needed to ensure better quality and efficiency in supply chain management within the sector. Related to this, breaking down functional barriers between supply chain stores, within health sector as well as between

organizations, is a necessary condition for enhanced integration. This will ensure performance in the health care supply chain management.

Problems with communication and integration might well benefit from the nomination of care coordinators in the supply chain. A related issue is the question whether general practitioners have the necessary skills to operate as such. More generally, in the health care sector, more emphasis on supply chain coordination is required. Policy should also stimulate the provision of more coordinated services. The costing system should be fragmented because it is predominantly medical specialism driven.

5.5. Limitations of the study

The major limitation of the study is that the data was collected from a small convenience sample of staff at KEMSA. A study on a wider scale within the health sector including supply chain managers, nurses and doctors in the public hospitals and clinics in Kenya may provide different results. Another limitation of this study is that the research focused only on the supply chain performance in the health sector with a relatively small sample size that only targeted one organization, and therefore requires further research covering various organizations and institutions in the health sector and taking into consideration the specific conditions in the organizations and institutions. Finally, the supply chain performance measures presented in the study are only a proportion of the potentially relevant variables that might have been included. Moreover they sometimes are not the focal interest of researchers as well as practitioners. These measures only serve as examples and special attention is rather paid for structuring the vast major of measures.

5.6. Suggestion for future research

Based on the findings of the study it can be suggested that further research on how to implement a systems approach and a supply chain orientation in a health care setting should be conducted. Healthcare organizations should investigate the potential benefits that can come from IT-enabled SCM, such as barcode technology, enterprise resource planning (ERP) and Radio-frequency identification (RFID) that could improve supply chain efficiency by supporting supply replenishment and reduced operating cost. The role of top management in building supply

chains in health care, effectiveness of information sharing in supply chains should also be considered as an area of future study.

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APPENDICES

APPENDIX 1: QUESTIONNAIRE

Please fill in the questions by checking in (√) the correct answer.

Please answer all questions

All the data collected will be used only for the purpose of the study.

PART A: Demographic profile

1. Gender Male Female

2. Age

(Tick where appropriate)

18-24 years 25-34 years 35-44 years 45-54 years Over 55 years

3. Education level

(Tick where appropriate)

College/University Diploma Bachelors Degree Masters Degree PHD

Other (Specify).....

4. How many years have you worked for the organization?

(Tick where appropriate)

1-5 years 6-10 years 11-15 years Over 16 years

5. Please indicate the category you fall under.

(Tick where appropriate)

Management level: Top Middle Low

PART B: Supply chain management practices

Supply chain management revolves around access to accurate and timely information throughout the supply chain processes and networks, allowing organizations to make decisions quicker and with more accuracy.

6. Rate the following of supply chain management practices at KEMSA:

| | Strongly disagree | disagree | Not sure | Agree | Strongly agree |
|--|-------------------|----------|----------|-------|----------------|
| <i>The following supply chain management practices are practiced at KEMSA :</i> | | | | | |
| i. We are proactive and systematic in the supply chain | | | | | |
| ii. Track and trace products in the supply chain | | | | | |
| iii. Alert customers on product availability | | | | | |
| iv. Alert customers on status of shipment | | | | | |
| v. Timely delivery | | | | | |
| vi. Reduce lead time | | | | | |
| vii. Alert customers on late shipment | | | | | |
| viii. Monitor carrier's activities | | | | | |
| ix. Monitor regulatory and security issues | | | | | |
| x. We have ability to make mid-course corrections | | | | | |

PART C

Rate the performance of effective supply chain management at KEMSA

| | Strongly disagree | Disagree | Not sure | Agree | Strongly agree |
|---|-------------------|----------|----------|-------|----------------|
| <i>Supply chain management has led to:</i> | | | | | |
| i. Timely delivery of pharmaceuticals and non pharmaceuticals | | | | | |
| ii. Perfect order fulfilment | | | | | |
| iii. Good line item fill rate | | | | | |
| iv. Lower order fulfillment leadtime | | | | | |
| v. Faster supply chain response time | | | | | |
| vi. Faster response to customer complaints | | | | | |
| vii. Lower cost of goods sold | | | | | |
| viii. Value added productivity | | | | | |
| ix. Reduced returns processing costs | | | | | |
| x. Faster cash to cash cycles | | | | | |
| xi. Lower inventory days of supply | | | | | |

PART D

The following challenges are faced by KEMSA in supply chain management

| | Strongly disagree | Disagree | Not sure | Agree | Strongly agree |
|--|-------------------|----------|----------|-------|----------------|
| | | | | | |

| | | | | | |
|--|--|--|--|--|--|
| <i>Supply chain management challenges faced by KEMSA include:</i> | | | | | |
| xii. Poor infrastructure | | | | | |
| xiii. Bulky materials to be transported | | | | | |
| xiv. Lack of financial resources | | | | | |
| xv. Lack of proper planning | | | | | |
| xvi. Special materials to be transported | | | | | |
| xvii. Uncertainty in terms of demand | | | | | |
| xviii. Uncertainty in terms of supplies | | | | | |
| xix. Lack of cold chain maintenance | | | | | |
| xx. Poor order request form filling | | | | | |
| xxi. Late arrival of order request form | | | | | |
| xxii. Lack of qualified personnel | | | | | |

Thank you!