FACTORS INFLUENCING THE EFFECTIVENESS OF LOGISTICS MANAGEMENT INFORMATION SYSTEMS IN PUBLIC HEALTH SECTOR: A CASE STUDY OF KENYA MEDICAL SUPPLIES AUTHORITY

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DECLARATION

This research project is my original work and has not been presented for a degree at any other university.

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This research project has been submitted for examination with my approval as the University Supervisor.

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I thank Him, I give all the glory to God for making this possible, with Him I am everything and without him I am nothing.

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Finally and most important, my sincere gratitude goes to my family for their support. This journey would not have been possible if it were not for their tireless strength, encouragement and reminder that this sacrifice was worth to be. Thank you all for the sacrifice and letting me have a good education and achievements full of life moments.

God bless them all.

DEDICATION

This is a dedication to my Loving parents John FK Mutugi and Judith Wanjiru for their moral support in needs during the entire project. To my loving brother Robert and sister Mary, for their encouragement, continued prayers and support in making this project completion a success. I am as I am because of them.

ABSTRACT

The aim of this study was to determine the factors influencing the effectiveness of LMIS in the Public Health Sector a case of KEMSA. The particular objectives that were analyzed include to determine the factors influencing the effectiveness of LMIS in the Public Health Sector and to establish the challenges of LMIS usage in the Public Health Sector. Descriptive design was adopted with 50 respondents considered for the sample. A census was used and a total of 50 questionnaires were administered for research. 40 questionnaires of valid answers were returned and analysis and various tests were done using SPSS. This was commanded to produce frequency tables, graphs and the necessary measure of variance for effective interpretation. The research findings in the research indicated that LMIS effectiveness was as a result inbound logistics, performance management, information quality, usability, reliability, logistics cost and inventory control. The study was of great importance to KEMSA, Kenyan government and donors it assisted in identifying areas of improvement in LMIS process. The study suggests that future researchers should do the same using other factors not only the information system factors but from other corresponding factors that influence the effectiveness of the information systems

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LIST OF ABBREVIATIONS

ARVs	Antiretroviral drugs
DANIDA	Danish International Development Agency
D& M	Delone and Mclean Model
FBOs	Faith Based Organizations
KEMSA	Kenya Medical Supplies Authority
LMIS	Logistics Management Information Systems
MIS	Management Information Systems
MOMs	Ministry of Medical Service
MOPHS	Ministry of Public Health and Sanitation
NGOs	Non-Governmental Organizations
SDPs	Service Delivery Points
SPSS	Statistical Package for Social Sciences
TAM	Technology Acceptance Model
TB	Tuberculosis
USAID	United States Agency for International Development

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CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Health is an important indicator of the status of development of a society and country. While in Kenya citizens have access to both public and private health care services, typically the common citizens in the country are largely dependent on the public services. Managing these scarce resources effectively becomes a crucial task, and a significant aspect in this regard is the Logistics Management information System (LMIS). Supply chain management is known to be the backbone of healthcare systems and this arises from the fact that health care is so dependent on the logistics availability of drugs and other medical supplies got at the right time and in the right quantities for the management of patients. New business models based on new ways of designing logistics flows and supply chains have emerged during the past couple of decades. The health care industry is undergoing major revolutions as far as supply chain management is concerned (USAID, 2010).

Supply chain management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. It is an operational management technology, which can make the activities of enterprises ranging from only the best for the big expansion of the logistics activity to all the functions of the enterprise. These functions include marketing, processing, manufacturing and finance, all of these functions to the best way to work closely together

as a whole. Equally, supply chain management is the expansion of the integrated management of logistics, its purpose is to organize the logistics functions and supply chain partners such as the functions of the logistics part of a merger or seamless connectivity to internal logistics functions and external suppliers and customers, or third-party logistics league to connect together to form a complete integrated system (Aitken, 2003).

Logistics management deals with the planning and control of material flows and related information in organizations, both in the public and private sectors. Generally speaking, its mission is to get the right materials to the right place at the right time, while optimizing a given performance measure and satisfying a given set of constraints. Logistics is one of the most important activities in modern societies. It is constructed on subsystems which in turn contain a collection of interrelated components. The relationship between the subsystems and components takes the form of coordination and exchange of materials and information. The aim of the system is to supply customers efficiently with their required products. Each subsystem controls the size of the flow of materials through the system via storage, transportation and various stages of handling and value adding. The logistics systems do not only consist of flows of materials, components and products which are processed and distributed to customers, but also include supply chain flows of spare parts and return flows of defective and used products and packaging (Jonsson, 2008).

1.1.1 Logistics Management Information Systems

Logistics and management information systems (LMIS) is a management information system that collects, records, and reports logistics data. The LMIS can be manual (paper based), partly computerized, or entirely computerized. A well-functioning LMIS provides decision makers throughout a supply chain with accurate, timely, and appropriate data. The LMIS ensures or fulfills the rights of a supply system by delivering the right products the right quantities, in right time, in the right condition, for the right cost and to the right place (Frazelle, 2002). The system serve a variety of functions such as managing data on the quantity of medicines or supplies needed at specific service delivery point (SDP), reporting on current stock levels of supplies at service delivery points and storing, tracking data regarding usage of medical commodities over time at all levels of the health (USAID, 2012).

1.1.2 Effectiveness of Logistics Management Information System (LMIS)

Generally, manual systems are very slow, inconsistent, and error prone, with frequent information delays. A manual system seriously restricts a company's ability to reduce total costs while simultaneously maintaining or improving customer service. Some common problems include the inability to detect pricing errors, and lack of access to timely credit information, or difficulties in determining inventory availability. Timely and accurate information has value. Computerized systems can potentially help managers to integrate various aspects of the logistics systems and allows the reduction of costs through improved inventory and freight management. The communication network is clearly a key factor in achieving effective logistics systems (Stock and Lambert, 2001).

LMIS in supply chain provides decision makers and customers with accurate, timely and appropriate data such as stock on hand, loss and adjustments, consumptions, demand, issues, shipment status and information about the cost of commodities managed in the system. The system equally facilitates planning at all levels through data analysis and sharing, which enable planning to occur at the strategic, tactical, and operational levels. Similarly, it gathers, integrates, and analyzes logistical data to streamline local and global supply chain. The effectiveness of any system hinges on the visibility of constituent parts and processes. The system allows organizations to track the flow of both information up and down, helping the organization know how well the supply chain is functioning. Training personnel within the health system to manage the information systems has frequently been overlooked by donors and governments until the system breaks down (Gunasekaran et al., 2004).

1.1.3 Kenya Medical Supplies Authority

The public health sector comprises of the public system, with major players including the Ministry of Health (MOH), parastatal organizations, NGO, and FBO facilities. Health services are provided through a network of over 4,700 health facilities countrywide. The public health system consists of the following levels of health facilities: National referral hospitals, County General Hospitals, County Hospitals, Health Centers, and Dispensaries (KHP, 2012).

Kenya Medical Supplies Authority (KEMSA) is the sole public sector supplier of health commodities. KEMSA was established as a state corporation, under legal notice No. 17

of 2000 to contribute to the improved availability of medicines and supplies and to the reversal of the decline of the health status of Kenyans. The agency was mandated to manage the procurement and distribution of the public sector healthcare supply chain. Over the seven years, regardless of the countless operational setbacks it faced, the organization has implemented a centralized supply chain network, established scheduled deliveries to over 4001 customers through outsourced transport and continued to serve its customers. However, the supply chain functions are hampered due to lack of appropriate funding for the procurement of the medicines and supplies to meet the needs of the customers. Substantial assessments and efforts continue to find the right solutions which allow KEMSA to achieve its intended mandate. Most of these are aimed at addressing the operational bottlenecks and improving core internal processes.

As a specialized government medical logistics provider for Ministries of Medical Services (MOMs) and Ministry of Public Health and Sanitation (MOPHS), Public Health for supported health facilities and programs. It plays the role of forecasting, procuring, storing and distributing health commodities which include essentials drugs and management of vaccines, ARVs, family planning, tuberculosis (TB) drugs, and other medical equipment for the public sector. The legal notice outlined three key objectives to include: Develop and operate a viable commercial service for the procurement and sale of drugs and other medical supplies, Provide a secure source of drugs and other medical supplies for Public Health institutions, Advice 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(DANIDA, 2012).

1.2 Research Problem

Jack and Dan (1999) observed that technical issues like slow response time, lack of reliable data, and system quality and user satisfaction also play significant role in the making of an effective MIS system. During the last decade, the Health 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. Moreover, the redesign of health facilities and the implementation of information systems to integrate care programs have been frequently addressed as being critical strategies to decrease resource utilization and improve health care quality (Aptel and Pourjalali, 2001).

In Kenya, the health system programs faces a number of challenges that makes it difficult for supply chain to operate efficiently. Logistics plays a major role in ensuring that drugs and equipment are sourced and delivered within a reasonable time in order to serve its purpose. In the Public Health Sector; KEMSA is the only public institution that has the mandate of procuring and delivering drugs and equipment to various public health facilities in Kenya. There have been recent numerous county cases of health facilities having challenges of drug shortages, stock outs and delay of deliveries (USAID, 2012).

A number of research studies have been done regarding information systems effectiveness. Arovovich (2001) in their study found that supply chain for each of the different health commodities varied in coverage, availability of information and

commodities and logistics system performance. Their finding demonstrated that family planning commodities, tuberculosis and leprosy drugs and vaccines were generally maintained in full supply with relatively good supervision and information system. However, some issues were identified within the vertical programs, such as poor inventory controls at the service delivery point level, poor reporting for reproductive health commodities and high wastage rate.

Phyllis (2013) undertook a study on adoption of ICT brought about having positive change in the system according to the response in the quality service being offered. The information system was non-operational because of chronic stock outs, poor supervision and monitoring and the absence of regular reporting of stock level and consumption trends. In general, lack of transportation and communication were among the levels of the system supervision and monitoring of stock levels and consumption difficult. Sedera ,G, (2004)explored several models including the Delone and Mclean Model (D&M) and Seddon model against empirical data and determined that D&M provided the best fit for measuring the system success. On the other hand Jacqueline (2013) argued that the system fails due to lack of top management support training and effective project management which plays a major role in success of the system.

From the above previous researches; it was clear that the studies conducted on the effectiveness of information systems showed little insight about information systems effectiveness. The Logistics Management information system (LMIS) is known to be an information system that has an extra Supply chain dimension as its factors for

effectiveness and may thus differ from other Management information Systems (MIS). The study therefore sought to provide insight about logistics management information system (LMIS) by answering the following research question: "what factors influence the effectiveness of LMIS in Public Health Sector?"

1.3 Research Objective

The objective of the study was to determine the factors influencing the effectiveness of LMIS in the Public Health Sector.

The specific objective of the study:

i. To determine the factors influencing the effectiveness of LMIS in the Public Health Sector.
ii. To establish the challenges of LMIS usage in the Public Health Sector.

1.4 Value of the study

The development of Logistics management information systems has for many years been regarded as the domain of the technical expert. In what appears to be a growing number of instances on the effectiveness of LMIS and appear to be having numerous challenges within the public health sector.

The findings of this study will therefore be of value to various people. The concept from the study will form a basis for further research to the academicians. There has been little study on the concept of LMIS and its effectiveness. The logistics and Information Systems are important field concepts that are beneficial to the management of LMIS. For decision makers at KEMSA, The findings from this will provide pertinent information on the extent of the effectiveness of LMIS in KEMSA.

The study will also contribute toward making of a more sound decision to the Government of Kenya (GOK) on the factor influencing LMIS to the policy maker. This will enable them make better reporting decision to Health facilities and General public. The study will also enable partners/ stakeholders have a better understanding on how well to help the health facilities during facilitation of program commodity funds using an effective LMIS. On the other hand, the public health facilities in Kenya on a day to day basis are faced with numerous challenges. This study will help the health facilities to mainly understand the factors influencing an effective LMIS and how to improve on the same.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of the related literature on the subject under study presented by various researchers, scholars, authors and analysts. It provides literature on Supply Chain Management, Logistics Management information Systems, as well as the summary of research gaps.

2.2 Logistics Management

Logistics is the process of strategically managing the acquisition, movement and storage of materials, parts and finished inventory and related information flows through the organization and its marketing channels in such a way that current and future profitability are maximized through the cost effective fulfillment of orders (Christopher, 2005). Logistics is that part of Supply Chain Management (SCM) 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 (Murphy and Wood, 2008).

The American Council Of Logistics Management Frazelle, (2002) defines Logistics as the process of planning, implementing and controlling the efficient, cost effective flow and storage of raw materials in processed inventory, finished goods and related information from point of origin to the point of consumption for the purpose of

conforming to customer requirements Logistics has helped many successful companies around the world to transform cost proposition into value proposition, therefore leveraging the companies for a competitive edge in a dynamic and turbulent global market . Several companies are making a paradigm shift by looking at the logistics as an opportunity rather than a cost center. They are leveraging logistics to improve the service level of the customers, to accelerate the speed of launching new products and enter new markets faster than before within and beyond the national boundaries (Sople, 2012). Indeed in the contemporary business environment, logistics is as much about the flow and storage of information as it is about the flow and storage of goods. Logistics is one of the major enablers of growth of trade and commerce activity in a country. At a macro level, the logistical infrastructure such as modes of transportation, transportation equipment, storage facilities, connectivity and information processing, are contributing to a large extent to the physical movement of goods produced in manufacturing, mining and agricultural sectors. The speed and reliability in distribution from a place of production to the place of consumption contributes greatly to the growth of a country's domestic and international trade.

Logistics management deals with the planning and control of material flows and related information in organizations, both in the public and private sectors. Generally speaking, its mission is to get the right materials to the right place at the right time, while optimizing a given performance measure and satisfying a given set of constraints. Logistics is one of the most important activities in modern societies. It is constructed on subsystems which in turn contain a collection of interrelated components. The

relationship between the subsystems and components takes the form of coordination and exchange of materials and information. The aim of the system is to supply customers efficiently with their required products. Each subsystem controls the size of the flow of materials through the system via storage, transportation and various stages of handling and value adding. The logistics systems do not only consist of flows of materials, components and products which are processed and distributed to customers, but also include supply chain flows of spare parts and return flows of defective and used products and packaging (Jonsson, 2008).

The term Logistics in ancient times was frequently used in connection with the art of moving armies and supplies of food and armaments to the war front. Its use can be traced back to the seventeenth century in the French army .Logistics can also defined as the management of the movement of raw materials, work in progress, finished goods, resources, parts, funds and information across the supply chain in order to satisfy customer needs. It integrates functional activities like transportation, inventory management, warehousing, material management and packaging of goods. The logistics management activities typically include inbound, outbound transportation management, fleet management, warehousing, materials handling, order fulfillment, logistics network design, inventory management, supply, demand planning and management of third party logistics service providers (Frazelle, 2002).

2.3 Logistics Management Information System (LMIS)

Information is the motor that drives the logistics cycle. Without information, the logistics system would not be able to run smoothly. Managers gather information about each activity in the system and analyze that information to coordinate future actions. For example, information about inventory levels and consumption must be gathered to ensure that a manager knows how much more of a product to procure. Logisticians added the word logistics to Management Information System (MIS) to create Logistics Management Information System (LMIS). They wanted to make it clear that the collection of data for logistics is a separate activity from the collection of data for other information systems. Logistics is not just a set of operations to move products from one place to another, but rather a key element on helping the people to meet their needs and to achieve the goals of various activities. Logistics refers to activities concerned with selecting, financing, delivering, and distributing supplies (Frazelle, 2002).

An LMIS is a system of records and reports whether paper based or electronic used to aggregate, analyze, validate, and display data (from all levels of the logistics system) that can be used to make logistics decisions and manage supply chain. The term supply chain describes the various organizations and activities that are linked to the delivery of supplies from the manufacturer to the different agencies involved, governmental and private, on to the end clients. Similarly it is also the flow of supplies through storage and transportation to the facilities central and regional warehouses, province and district stores to Service Delivery Points (SDPs) and to end users. In fact the terms “supply chain management” and “logistics” are often used interchangeably (USAID, 2000).

According to Lucey (2005), information system is made up of a number of components. Some of the components are pencil and paper, word processor, computers and communications networks, operating systems and procedure manuals, and people (customers, suppliers, managers or clerks) to construct, work with, and operate such components. The information system must be capable of effective data retrieval and data processing, data analysis and report generation. The speed and quality of the information flows have direct impact on the cost and efficiency of the entire logistic system. Slow and erratic communications can lead to loss of clients or excessive transportation, inventory, and warehousing costs, as well as possible manufacturing inefficiencies through frequent line changes. The order processing and information system forms the foundation for the logistics and corporate management information systems. A logistics management information system is necessary in order to provide management with the knowledge to make strategic and operational decisions about providing supplies. The LMIS may be fully automated or manual, and most of them are somewhere in between. Depending on the sophistication of the system, the quality and speed of information flow will vary (Lambert, 2004).

The information system collects, processes, and reports supply chain data. A well-functioning LMIS provides decision makers throughout a supply chain with accurate, timely, and appropriate data. It can be manual (paper based), or partly or wholly computerized. For any supply chain system, there are five essential LMIS data items quantity of stock on hand, quantity of stock consumed (dispensed to users), losses and

adjustments, dates of orders/ receipts and amounts on order (USAID, 2010). These are explained as below:

In Stock on hand the supply chain managers must know exactly what products and how much of each item are in stock and where to locate the stock. Data about stock on hand provide this information and at the service delivery level, data guides decisions; such as when a new order should be placed. Quantity of stock consumed on the other hand is the top priority for LMIS to collect and report accurate information about clients' consumption and use of various supplies. Program managers use this data collected to determine how many supplies to order and for each need met (USAID, 2010).

Even the best logistics systems experience some supply losses due to expiration, theft, damage, or mishandling. Losses and any other adjustments in supplies such as transferring supplies from overstocked locations must be recorded and reported separately from data consumption. These separate records allow managers both to deal with the causes of losses and adjustments and to develop more accurate forecasts of future client demand. The LMIS system is known to have dated transaction records also called issue vouchers or requisition and issue vouchers which govern the flow of supplies from one point in the supply chain to the next. For example to prevent health commodities or stocks from being lost during shipment, both the facility sending and receiving is responsible to track the amount requested and the dates that the supplies were ordered and received. When managers know the lead times, they are able to set maximum and minimum inventory levels and also calculate when to reorder. Managers who wait too long to reorder, run the risk of stock outs, and those who order too soon spend more

on interest costs, transportation and may be after stocking costs. Risking losses due to product expiration is another important consideration in ordering decisions (USAID, 2010).

2.4 Factors influencing LMIS Effectiveness

Information system effectiveness is the extent to which a specific information system actually contributes to achieving organizational goals, that is, its effect on organizational performance (Hamilton and Chervany, 1981).The influence LMIS effectiveness is factored under information system factors and supply chain management factors.

1.4.1 Information System factors

As the output of an information system or the message in a communication system, information can be measured at six different levels which include the Information quality, Service quality, system quality, usage, user satisfaction and Net benefit (Deleon & Mclean, 2003). They defined the six as the accuracy and effectiveness of the system, the success of the information in conveying the intended meaning, and the effect of the information on the receiver respectively.

Information quality is to measure outputs of an information system. Wixom and Todd (2005) defined information quality as the completeness, accuracy, format, and currency as four information quality antecedents. They investigated information quality dimension by measuring the usefulness of information acquired from a data warehouse. This information can be primarily in the form of reports. On the other hand Service quality

measures the extent of service that information system users experience from communities. This can be measured through system tangibility, reliability, responsiveness, assurance, and empathy. Information system is dependable means reliability; Information system is responsiveness means employees give prompt service to users; Information system is assurance means employees have the knowledge to do their job well; Information system is empathy means has users' best interests at heart (DeLone & McLean 2003).

According Rai et al (2002) user friendliness and ease of use are the two instruments to measure System quality. For this IS success measuring system quality involved nine items: ease of use, ability to locate data, data quality, ease of learning, user requirements, system features, system accuracy, sophistication and integration. Wixom and Todd (2005) defined reliability, flexibility, integration, timeliness as the measures of system quality in their combined model of user satisfaction and technology acceptance. Lambert et al, (2004) Usage measures everything from a visit of the Website to its navigation within the site, to information retrieval, to execution of a transaction. User satisfaction is measured through efficiency and effectiveness of the system and net benefit measures through the positive and negative impact from the customer.

1.4.2 Supply Chain Management factors

Supply chain consists of all parties involved, directly or indirectly, in fulfilling a customer request. The supply chain not only includes the manufacturer and suppliers, but also transporters, warehouses, retailers, and customers themselves. Within each organization, the supply chain management includes all functions involved in receiving

and filling a customer request. These functions include Demand forecasting, production, marketing, and Warehousing, operations, distribution, finance, and customer service. Supply Chain encompasses the companies and the business activities needed to design, make, deliver, and use a product or service. Businesses depend on their supply chains to forecast on what they need in order to survive and thrive (Frazelle, 2002).

Every business fits into one or more supply chains and has a role to play in each of them. The pace of change and the uncertainty about how markets evolve has made it increasingly important for companies to be aware of the supply chains they participate in and to understand the roles that they play. Effective supply chain requires simultaneous improvements in both customer service levels and the internal operating efficiencies of the companies in the supply chain. Customer service at its most basic level means consistently high order fill rates, high on time delivery rates, and a very low rate of products returned by customers for whatever reason. Internal efficiency for organizations in a supply chain means that these organizations get an attractive rate of return on their investments in inventory and other assets they find ways to lower their operating and sales expenses (Hugo, 2003).

The ability to manage customer relationships, both internal to the organization and external, and supplier relationships is fundamental to success in supply chain management. The key factors that information system in supply chains must have but not limited may include: Warehousing, Demand Forecasting, Production and Logistics (Frazelle, 2002).

2.5 Challenges of LMIS Implementation

Beaumaster (1999) identified and categorized challenges regarding the information system implementation as issues that were created and also worsen with time. The more specific categorizations of these issues can be viewed as: management process issues, organizational environment issues, leadership issues, technical systems issues, and personnel issues.

Management process issues speak of functional operation of an organization such as budgeting, personnel, and general management. Organizational environment issues are identified as factors which are less tangible such as organizational culture, change, and behaviour. Leadership issues relate to the areas which involve the interaction and direction of the organization executive. Technical systems issues are mainly those referring to the hardware and software considerations of information technologies. Personnel issues are those issues surrounding each individual in the organization. These issues impact the planning, procurement, and deployment of information systems in their organizations (Beaumaster, 1999).

According to Kwon and Zmud (1987), MIS implementation processes were not easy to achieve. They also identified some issues which many organizations have faced and these factors also impacted organizational processes and products associated with each implementation stage. These factors include characteristics of the organization (specialization, centralization, formalization), characteristics of the system being adopted (complexity), characteristics of the task to which the system is being applied (task

uncertainty, role and responsibility of person performing the task, task variety), and characteristics of the organizational environment (uncertainty, inter organizational dependence). Another perspective of MIS challenges is also shown by Lucey (2005) that the problems relate to MIS included the following; lack of management in the design phase of the MIS, inappropriate emphasis of the computer system, undue focus on low level data processing applications, lack of management knowledge of computers, poor appreciation by information specialists on information requirements and lack of top management support. All this factors were seen to affect the MIS from being effective.

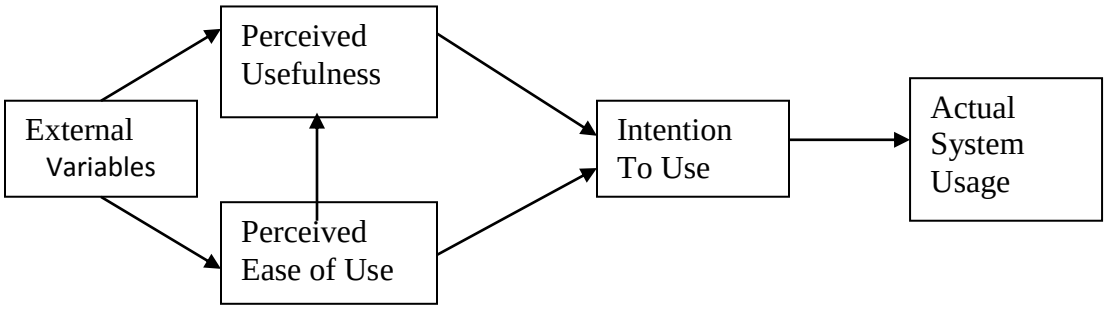
2.6 Theories of Information Systems

Theories of information systems are considered to comprise various models and approaches:

2.6.1 Technology Acceptance Model

The Technology Acceptance Model (TAM) was developed by Davis (1989) to explain the Theory of Reasoned Action (TRA). According to Fishbein and Ajzen(1975) the theory needed to explain why some IS are more readily accepted by users than others. Subsequent research by Venkatesh (1996) refined the TAM suggesting that the mediating effect of attitude could be excluded as empirical evidence found that the attitude element did not fully mediate the effect of perceived usefulness on intention to use.

Figure 2.1: Refined Technology Acceptance Model (TAM)



Source: adopted from Venkatesh (1996).

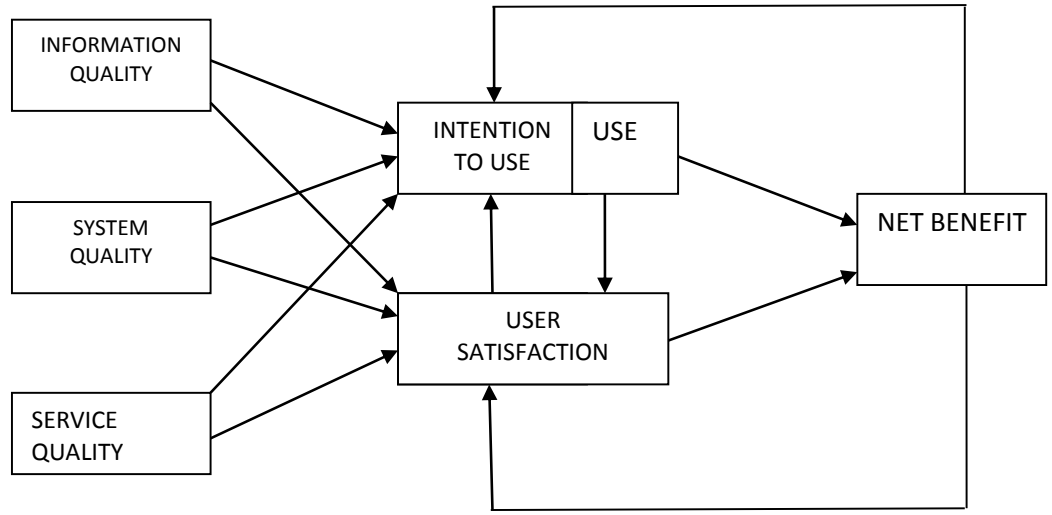
The TAM will predict information system acceptance and diagnose design problems in Logistics Management Information Systems (LMIS) before users have experience with a system. User acceptance of LMIS system through TAM model will be determined their perceived usefulness and perceived ease of use. Within the model, perceived usefulness is defined by the degree to which they believe that using the system will enhance performance. Perceived ease of use is defined as the degree to which the user believes that using the LMIS system will be free from effort. This will impact on user's attitude toward using the LMIS system is shown by their feelings of being favorable or unfavorable to the system.

2.6.2 The DeLone and McLean Models

According to Mason (1978) the information system produces information that is, afterwards, communicated to the recipient who is subsequently influenced by the information. On level of information transfer DeLone and McLean (2003) concluded that there are six distinct categories or aspects of information systems: (a) system quality, (b)

information quality, (c) Service quality, (d) Usage, (e) user satisfaction, and (f) Net benefit.

Figure 2.2: The De Lone and Mclean Model



Source: De Lone and Mclean (2003)

On LMIS effectiveness, the Deleon and Mclean model will be able to assess the gap based on the information collected from the system.

2.7 Empirical Review and Research Gap

Phyllis (2013) indicates that adoption of ICT is brought about by having positive change according to response in the quality service being offered and that it has also led to better process efficiency with the organization. This has also resulted to cohesion between departments and the relation of the organization and with other firm. Jacqueline (2013) argued that systems fails due to top management support training and effective project

management plays a major role in success of the system. McGill T, (2003) examined the information system and found for path to success model System quality affect use; information quality affects use intended for individual impact that affects organization impact. However Sedera et al., (2004) study tested and revealed several models including the Delone and Mclean Model (D&M) against empirical data and determined that Delone and Mclean model provided the best fit for measuring the system success.

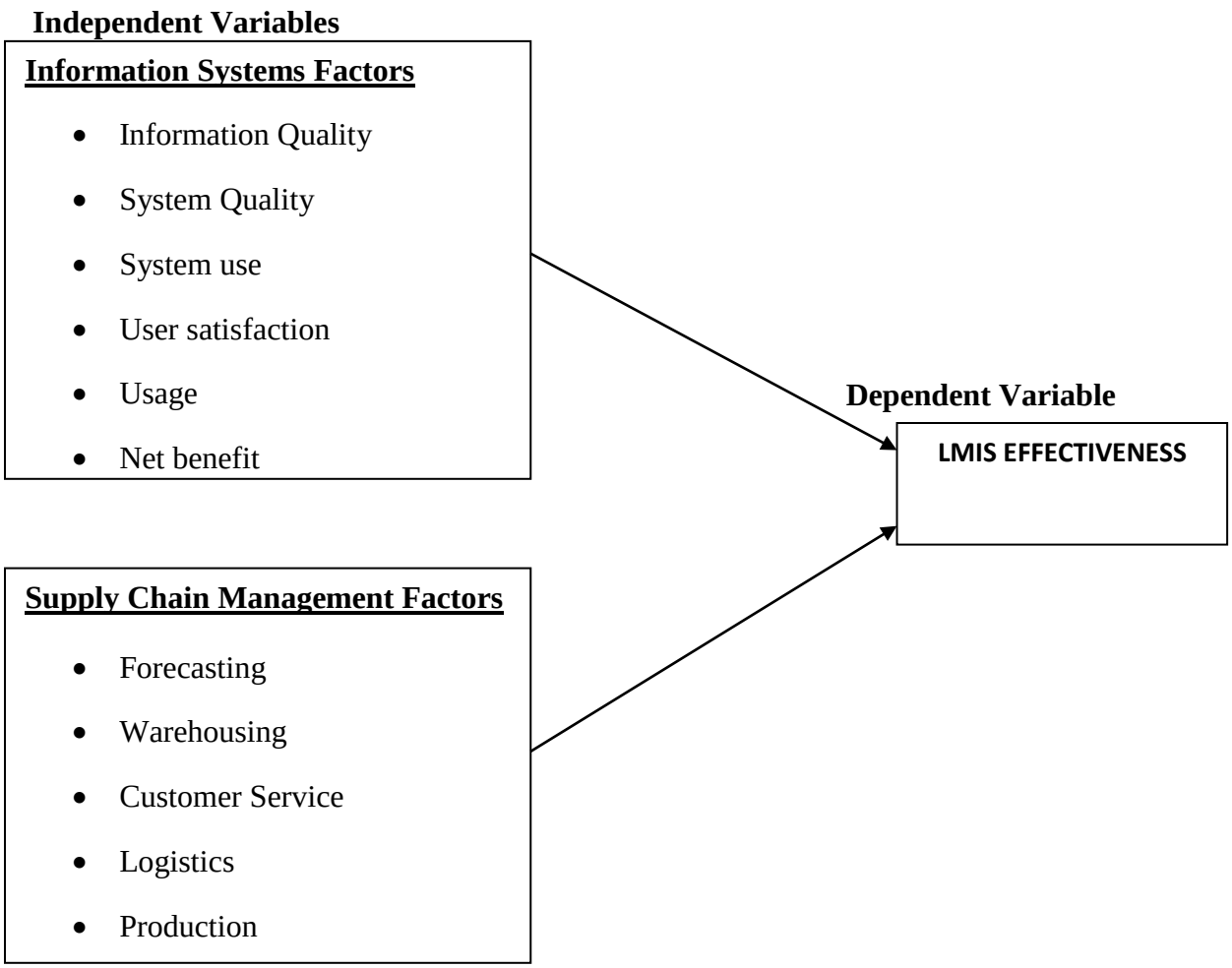
From the foregoing literature effects and challenges have been discussed. It is evident that the concept on effectiveness of information system has been in looked. According to Mason and Swanson (1981) management information systems is described in to four categories namely: databank information system, predictive information system, decision making information system, and decision taking information system. This results to an information system having various factors affecting it. Hence this leads to have more empirical research done to establish the factors that influence effectiveness of logistics management information systems (LMIS) in the public health sector.

2.8 Literature Review Summary

In summary, studies have shown Logistics Management Information systems effectiveness exist under different model models and categories. Manson and Swanson (1981) shows the information system is classified under different categories which makes the system to behave differently in use. This shows that the LMIS system may produce different results than what was expected under the model and supply chain management factors.

2.9 Conceptual Framework

Figure 2.3: Conceptual Framework



The conceptual framework illustrates how the two independent variables, information system factor and supply chain management factor interrelate in order to influence LMIS effectiveness the dependent variable. Information system factor key factors are information quality, system quality, system use, user satisfaction, usage, service quality and net benefit. Supply chain management factor with its key factors as warehousing, customer service, logistics and production. A series of analyses was run to understand the factor structure within the data set. The primary analysis was factor analyses, which essentially showed sets of variables that, were highly correlated with each other.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter sets out to bring in various stages and phrases that were carried out to bring out the study. The chapter describes the research design, the target population, the data collection and the method of data analysis.

3.2 Research Design

This study employed descriptive survey to assist the researcher in an in-depth analysis of the LMIS effectiveness in the public health sector through KEMSA. According to Konthari (2004) the decision is propagated by the descriptive nature of typical qualitative and quantitative data to be collected which was cross sectional and may not favor a case study. It was the easiest for the researcher to use, convenient and also due to time limitation.

3.3 Population

According to the KEMSA human Resource Department records (2014) LMIS operation had 50 staff members assigned on it. The population comprised of 50 staff members and partners in Kenya medical supplies authority who used LMIS on their daily task operation. The 50 staff members and partners came from 5 departments mainly; customer service, Warehouse, Distribution, IT and Technical department. The researcher

conducted a census for the 50 staff members and partners. This was also because the targeted respondents had vast information on the area under study.

3.4 Data Collection

The study employed use of primary data. Data was collected via the use of a structured open and closed ended questionnaire. Data collection was guided by the structured questionnaire in appendix 1 of the research. Data was collected by drop and pick later questionnaires from respondents, that is, Officers, Supervisors and Managers on a five-point Likert scale. There were fifty questionnaires to be filled ten for each department. The questionnaires were divided into four parts. Part A focused on the demographic profile of the respondent; Part B concentrated on LMIS effectiveness in terms of information system factor, Part C concentrated LMIS effectiveness in terms of Supply chain management factor and Part D concentrated on Challenges of LMIS implementation in the public Health sector.

3.5 Data Analysis

Data collected was analyzed to gain a more in-depth understanding of LMIS effectiveness in public health sector through KEMSA. The process of data analysis involved two stages of addressing the two objectives, namely; to determine the factors influencing the effectiveness of LMIS in the public Health sector and to establish the challenges of LMIS implementation in the public health sector.

Descriptive statistics of quantitative data was obtained through the use of survey instrument and was treated as follows: Data related to part A was analyzed using frequencies and percentages, data related to part B, C and D was analyzed using Factor analysis. Factor analysis summarizes important information contained in the data by a few number of factors and identification of the constructs or dimensions that underlie the observed variables. It isolates and eliminates variables that do not seem to belong with the rest of the variables, as well as the dimensions captured by the measure. Thus the principal component analysis reveals several measures of a domain can be combined in to a single measure (De Coster, 1998).

CHAPTER FOUR

DATA ANALYSIS, RESULTS AND DISCUSSION

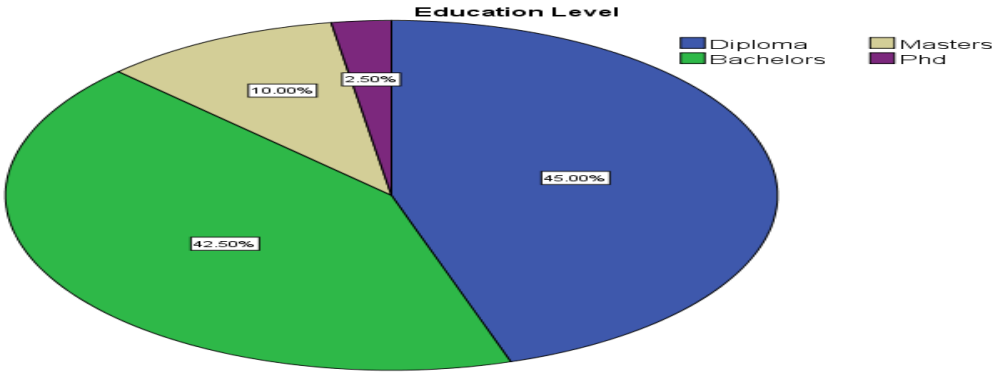
4.1 Introduction

The results of the study were presented according to the data analysis procedures outlined in the previous chapter. The collected data was analyzed in line with the objectives. The analysis results were presented in charts and tables. Factor analyses were performed to identify the underlying factors influencing LMIS effectiveness and as per the given objectives, namely: to determine the factors influencing the effectiveness of LMIS in the Public Health Sector and to establish the challenges of LMIS usage in the Public Health Sector.

4.2 Demographic characteristics of the respondents

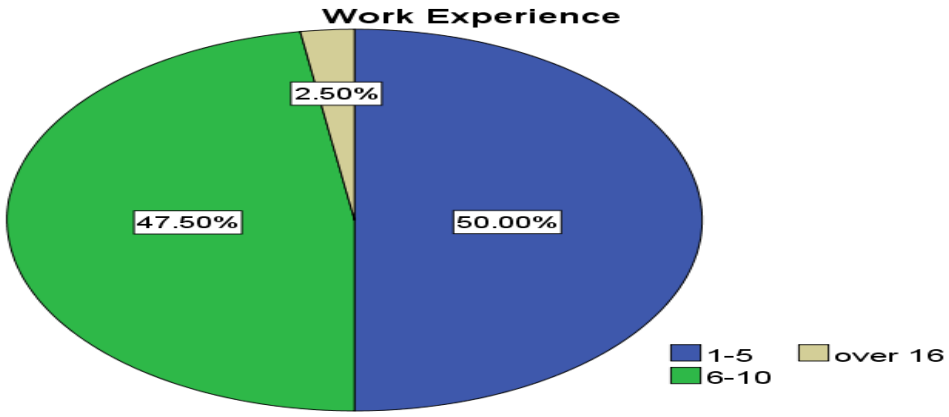
A total of 40 questionnaires were collected and analyzed for the users' on LMIS effectiveness. Demographic data were collected regarding the respondents', education, work experience and job level.

Figure 4.1: Level of Education Analysis



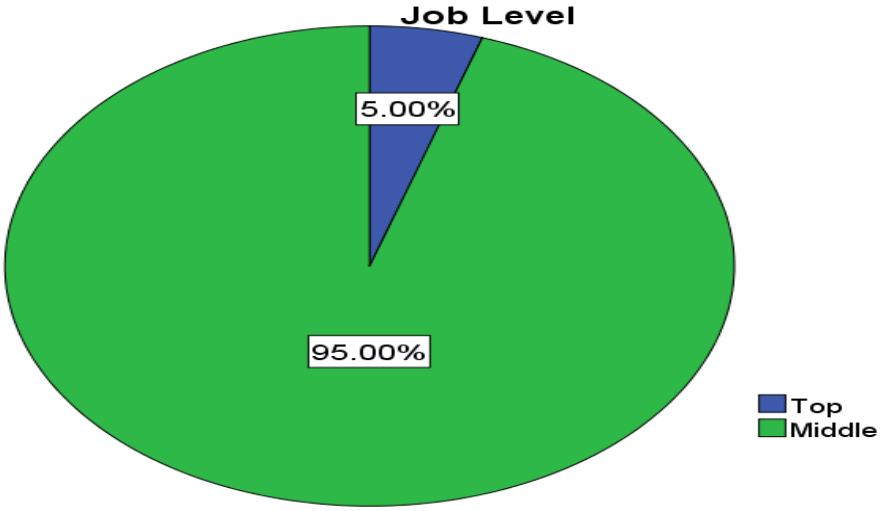
From the above chart the majority respondents' level of education is of Diploma with 45% followed by Bachelor degree with 42.5%.

Figure 4.2: Respondent Work experience Analysis



The above chart most respondent have been working for 1-5 years with 50% followed by 6-10 years with 47.5%.

Figure 4.3: Job level Analysis



From the above chart majority of the respondent are from the middle job level with 95%

4.3 Factors influencing the effectiveness of LMIS and challenges of its usage in Public Health Sector

The objectives of the study were to determine the factors influencing the effectiveness of LMIS as well to establish the challenges of its use in the Public Health Sector. The researcher explored these factors by presenting the respondents with a list of factors concerned with LMIS effectiveness for them to rate the extent to which each factors influenced LMIS effectiveness in a likert scale of 1-5, that is, Not at all, Small extent, Moderate, Large extent and Very large extent whereas the challenges were examined as strongly disagree, disagree, not sure, strongly agree and agree on the same likert scale. The researcher analyzed the responses through the use of Factor analysis method using statistical package for social scientist.

4.3.1 Information System and Supply Chain Management as Factors influencing LMIS effectiveness

The factor analysis presented a KMO and Barlett's test to check on the suitability of the sample used in the study which indicates a weak reliability since the adequacy is less than 0.5, which is the suggested minimum.

Table 4.3.1.1: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.3581
Bartlett's Test of Sphericity	Approx. Chi-Square	1574.93
	df	703
	Sig.	.000

From the table 4.3.1.1 above the Bartlett's test is significant; this indicates the sample used was not adequate enough for the use of factor analysis. The Bartlett's test of Sphericity tests a null hypothesis and the original matrix is an identity matrix against an alternate hypothesis that the correlation matrix of the variables is not an identity. If the correlation matrix is identity it means the variables are independent and not related to one another and if correlation matrix is not an identity matrix it means the variables are related. For factor analysis to be authenticated then there is need to be some relationship between the variables. In our case the significance/ p value of the Bartlett's test of Sphericity is 0.00. Since P value is less than 0.05 it means that the variables are related the use of factor analysis is correct.

Table 4.3.1.2: Total Variance Explained

Component	Initial Eigen values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	19.910	38.289	38.289	19.910	38.289	38.289	7.227	13.899	13.899
2	3.797	7.302	45.591	3.797	7.302	45.591	6.000	11.538	25.437
3	3.449	6.633	52.224	3.449	6.633	52.224	5.299	10.190	35.627
4	3.323	6.391	58.615	3.323	6.391	58.615	4.424	8.508	44.135
5	2.462	4.735	63.350	2.462	4.735	63.350	3.320	6.385	50.520
6	2.038	3.919	67.269	2.038	3.919	67.269	3.302	6.351	56.871
7	1.757	3.378	70.647	1.757	3.378	70.647	3.226	6.204	63.075
8	1.656	3.184	73.832	1.656	3.184	73.832	2.438	4.688	67.763
9	1.599	3.074	76.906	1.599	3.074	76.906	2.300	4.422	72.185
10	1.299	2.497	79.403	1.299	2.497	79.403	2.255	4.336	76.521
11	1.197	2.301	81.704	1.197	2.301	81.704	1.984	3.816	80.336
12	1.043	2.005	83.709	1.043	2.005	83.709	1.754	3.373	83.709
13	.910	1.749	85.458						
14	.829	1.594	87.053						
15	.802	1.542	88.595						
16	.665	1.279	89.874						
17	.642	1.234	91.108						
18	.586	1.126	92.235						
19	.548	1.055	93.289						
20	.481	.925	94.214						
21	.405	.778	94.993						
22	.363	.698	95.690						
23	.289	.556	96.246						
24	.284	.546	96.792						
25	.263	.506	97.298						
26	.222	.427	97.726						
27	.204	.392	98.118						
28	.186	.358	98.477						
29	.158	.305	98.781						
30	.144	.277	99.058						
31	.134	.257	99.315						
32	.084	.161	99.476						
33	.068	.131	99.607						
34	.053	.102	99.709						
35	.052	.099	99.808						
36	.040	.076	99.884						
37	.025	.048	99.932						
38	.020	.038	99.970						
39	.016	.030	100.000						

Extraction Method: Principal Component Analysis.

From the table 4.3.1.2 there are 39 possible factors or components as shown in the first column. The factors represent linear combinations of the variables that have some uniform variance. Eigen values are the variance of the factors. The total number of factors is equal to the total number of variable in factor analysis, in our case 39 variables. From the table, the Eigen values associated with each factor represent the variance explained by that particular factor and is displaced in terms of the percentage of the variance explained (so factor 1 explains 19.910. This factor explains relatively large amounts of variance.

Therefore we extract all factors with Eigen value greater than 1, which leaves as to twelve factors and the percentage explained in the column labeled extraction sums of squared loadings. In the final part of the table labeled rotation sums of square loadings, the Eigen values of the factors after rotations are displayed. For instance in the sum of squared loading factor 1 accounted for 38.289%, factor 2 accounted for 7.302%, factor 3 accounted for 6.633%, factor 4 accounted for 6.391%, factor 5 accounted for 4.735%, factor 6 accounted for 3.919%, factor 7 accounted for 3.378%, factor 8 accounted for 3.184%, factor 9 accounted for 3.074%, factor 10 accounted for 2.497%, factor 11 accounted for 2.301% and factor 12 accounted for 2.005%, of the variance data structure.

However after rotation factor 1 accounted for 13.899%, factor 2 accounted for 11.538%, factor 3 accounted for 10.190%, factor 4 accounted for 8.508%, factor 5 accounted for 6.385%, factor 6 accounted for 6.351%, factor 7 accounted for 6.204%, factor 8

accounted for 4.688%, factor 9 accounted for 4.422%, factor 10 accounted for 4.336%, factor 11 accounted for 3.816%, factor 12 accounted for 3.373% of the variance.

Table 4.3.1.3: Rotated Component Matrix

	Component											
	1	2	3	4	5	6	7	8	9	10	11	12
LMIS assist in gathering facility consumption data	0.832											
LMIS assist in order turnaround time	0.812											
LMIS helps you manage production flow	0.734											
LMIS record report data on lead time	0.694											
LMIS assist in decision making concerning health commodities	0.681											
LMIS helps retain valued customers	0.675											
LMIS estimates the quantities of various commodities that will be needed by a facility for a specific period of time	0.629											
LMIS provide reports that seem to be just about exactly what you need	0.607											
LMIS records report data of minimum stocks, maximum stocks, lead time for program medicines	0.533											
LMIS provide data reports on delivery of goods	0.507											
Using LMIS in my job enables me to accomplish my tasks more quickly		0.827										
LMIS information is important and helpful for work		0.676										
LMIS is helpful		0.671										
Using LMIS improves my job performance		0.628										
LMIS output is presented in a useful format		0.619										
LMIS purchase has saved individual consumers time and money		0.614										
LMIS is satisfactory			0.859									
LMIS is efficient			0.824									
LMIS is effective			0.797									
LMIS provide cost effective services			0.625									
Benefits such as large markets, customer responsiveness yielded positive net benefits for KEMSA			0.511									
LMIS adequately meets the information processing needs of			0.504									

your area of responsibility									
LMIS provides the precise information you need	0.743								
LMIS provide sufficient information	0.653								
LMIS accuracy is of satisfaction	0.595								
LMIS accurate	0.59								
LMIS information content meets your need	0.585								
LMIS is reliable		0.697							
Using LMIS makes it easier to do my job		0.686							
Using LMIS enhance my effectiveness at job		0.676							
Using LMIS in my job increase my productivity		0.545							
LMIS shows logistics cost used			0.863						
LMIS asses production cost			0.795						
Easy to use				0.708					
Compared to other computer software is easy to learn				0.65					
User friendly				0.615					
it is easy for me to become skillful at using LMIS				0.509					
I find it easy to get LMIS to do what I want to do					0.742				
LMIS support you incase of emergency					0.55				
LMIS is a success to every user						0.769			
LMIS is able to adjust data on commodities stock outs							0.741		
My using LMIS require a lot of mental effort								0.894	
I believe that LMIS is cumbersome to use								0.679	
LMIS information needed is on time									0.597

From the table 4.3.1.3 factor 1 has 10 variables grouped under Inbound Logistics Factors. Factor 2 had 6 variables grouped under Performance Management Factors. Factor 3 has 6 variables and Factor 7 has 4 variables all grouped under Usability Factors. Factor 4 has 5 variables, Factor 8 has 2 variables, Factor 9 has 1 variable and Factor 12 has one variable all grouped under Information Quality Factor. Factor 5 has 4 variables and Factor 11 has 2 variables all grouped under Reliability Factor. Factor 6 has 2 variables grouped under Logistics Cost Factor. Factor 10 has one variable grouped under Inventory Control Factor.

4.3.2 Challenges of LMIS usage

Table 4.3.2.1: Challenges of LMIS usage Total Variance Explained

Component	Initial Eigen values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.825	47.091	47.091	2.825	47.091	47.091	2.321	38.684	38.684
2	1.302	21.704	68.795	1.302	21.704	68.795	1.807	30.111	68.795
3	.891	14.847	83.642						
4	.613	10.209	93.851						
5	.221	3.680	97.531						
6	.148	2.469	100.000						

Extraction Method: Principal Component Analysis

From the table 4.3.2.3 there are 6 possible factors or components as shown in the first column. The factors represent linear combinations of the variables that have some uniform variance. Eigen values are the variance of the factors. The total number of factors is equal to the total number of variable in factor analysis, in our case 6 variables. From the table, the Eigen values associated with each factor represent the variance explained by that

particular factors and is displaced in terms of the percentage of the variance explained (so factor 1 and 2 explains 2.825 and 1.302 respectively. These factors explain relatively large amounts of variance. Therefore only two factors are with Eigen greater than 1, which leaves as two factors and their percentages explained in the column labeled extraction sums of squared loadings. In the final part of the table labeled Rotation sums square loadings, the Eigen values of the factor after rotation are displayed. Rotation has the effect of optimizing the factor structure and the consequence of this is that the relative importance of the factor is equalized. For instance factor 1 accounted for the variance of the data structure, factor accounted for 47.091% and factor 2 accounted for 21.704% of the variance.

From the factor analysis it emerged that there were two underlying factors in challenge factors that affect LMIS usage. This is because the total initial Eigen values is greater than 1. These two factors had a cumulative percentage of sums of square loading of 68.795%. The 68.795% means that the two factors are explained up to 68.795% of the total variance of the data. Having established that there were two factors that explained the highest variance in the data i.e. these were the factors that captured the variables that were the actually challenges encountered in the LMIS usage, the study explored the composition of these factors.

Table 4.3.2.2: Challenges of LMIS usage Rotated Component Matrix

	Component	
	1	2
Obsolete hardware and software	.937	
None involvement of the users in the system design and implementation	.827	
Resistance by company employees	.775	
Lack of enough resources		.743
Lack of training personnel		.580
Lack of proper planning		.885

From the table 4.3.2.2 factor 1 had 3 variables namely; Obsolete hardware and software, none involvement of the users in the system design and implementation, Resistance by company employees. These variables were grouped under information challenges. Factor 2 had three variables namely: Lack of enough resources, lack of training personnel, and lack of proper planning. These factors were termed as organizational challenges.

Table 4.3.2.3: Challenges of LMIS usage KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.532
Bartlett's Test of Sphericity	Approx. Chi-Square	98.487
	Df	15
	Sig.	.000

The challenges of LMIS use is by 53.2 percent as shown in the table 4.3.2.1 below using Kaiser-Meyer-Olkin Measure of Sampling Adequacy. The factor analysis presented a KMO and Barlett’s test to check on the suitability of the sample used in the study which

indicates a strong reliability since a change in any one of the factor leads to challenges of LMIS at a significant level.

4.4 Discussion of the Findings

Previous studies suggested that information effectiveness was as a result of information system factors like information quality, service quality, system quality, usage, user satisfaction and Net benefit (Deleon and Mclean, 2003). The two saw the six as the accuracy and effectiveness of the system. This findings coincided with Rai et al., (2002) and Wixom and Todd (2005) who went on and defined some of the factors as follows; system quality included ease of use, ability to locate data, data quality, ease of learning, user requirement, system features, system accuracy, flexibility, reliability and integration. User satisfaction as efficiency and effectiveness of the system, net benefit through the positive and negative impact from the customers. From these researchers it is evident that information effectiveness is as a result of information system factors.

The researcher took a study on effectiveness of LMIS in the public sector and found out that information system effectiveness may not only be as a result of information system factor but also from other factors. The researcher findings were captured in the analysis of the research objectives. This was therefore divided into two sections based on the research objectives.

4.4.1 Factors influencing the effectiveness of LMIS in the Public Health sector

The first objective of the study examined the factors influencing the effectiveness of LMIS in the Public Health sector. The study found out that inbound logistics, performance management, information quality, usability, reliability, logistics cost and inventory control as factors that had a strong influence in the effectiveness of LMIS. Inbound Logistics Factors strong influence was as a result of from LMIS assist in gathering facility consumption data, LMIS assist in order turnaround time, LMIS helps you manage production flow, LMIS record report data on lead time, LMIS assist in decision making concerning health commodities, LMIS helps retain valued customers, LMIS estimates the quantities of various commodities that will be needed by a facility for a specific period of time, LMIS provide reports that seem to be just about exactly what you need, LMIS records report data of minimum stocks, maximum stocks, lead time for program medicines, LMIS provide data reports on delivery of goods.

Performance Management Factors strong influence stated by Using LMIS in my job enables me to accomplish my tasks more quickly, LMIS information is important and helpful for work, LMIS is helpful, Using LMIS improves my job performance, LMIS output is presented in a useful format, LMIS purchase has saved individual consumers time and money. Usability Factors strong influence was as a result of LMIS is efficient, LMIS is effective, LMIS provide cost effective services, Benefits such as large markets, customer responsiveness yielded positive net benefits for KEMSA, LMIS adequately meets the information processing needs of your area of responsibility, Easy to use, Compared to other computer software is easy to learn, User friendly, it is easy for me to

become skillful at using LMIS. Information Quality Factors strong influence was as a result of LMIS provides the precise information you need, LMIS provide sufficient information, LMIS accuracy is of satisfaction, LMIS accurate, LMIS information content meets your need, I find it easy to get LMIS to do what I want to do, LMIS support you incase of emergency, LMIS is a success to every user and LMIS information needed is on time.

Reliability Factors strong influence was as a result of LMIS is reliable, Using LMIS makes it easier to do my job, Using LMIS enhance my effectiveness at job, Using LMIS in my job increase my productivity, My using LMIS require a lot of mental effort and I believe that LMIS is cumbersome to use. Logistics Cost Factors strong influence was as a result of LMIS shows logistics cost used, LMIS asses production cost. Inventory Control Factors was as a result of LMIS is able to adjust data on commodities stock outs. The result of this is also agreed by Sedera et al., (2004) that several other factors including those in Deleon and Mclean model provided the best fit of measuring system effectiveness.

4.4.2 The challenges of LMIS usage in the Public Health Sector

This study found out that the challenges observed in LMIS usage was as a result of Human Resource Challenges and Decision Making Challenges. The Human Resources Challenges were as a result of lack of enough resources, resistance by company employees, none involvement of the users in the system design and implementation.

Decision making challenges included obsolete hardware and software and lack of proper planning Lack of training personnel was found out to have no effect on its usage.

CHAPTER FIVE

SUMMARY CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter provides the summary, the conclusions and recommendations of the study, as captured in from the analysis of the study objectives.

5.2 Summary

This study extends the use of mc lean and Deleon model within the context of effectiveness of LMIS with inclusion of supply chain management factors. The study had two objectives namely; to determine the factors influencing the effectiveness of LMIS in the Public Health Sector and to establish the challenges of LMIS usage in the Public Health Sector from which research question were drawn to be answered by the study. Different questionnaires were used to collect the required information from the KEMSA staffs and partners. Descriptive statistics and factor analysis were the analysis technique used.

The overall findings indicated that factors influencing LMIS effectiveness were grouped under inbound logistics, performance management, information quality, usability, reliability, logistics cost and inventory control information quality and service quality had a strong influence.

5.3 Conclusion

The study concludes that the factors influencing LMIS effectiveness was as a result of inbound logistics, performance management, information quality, usability, reliability,

logistics cost and inventory control. However this was also brought by some challenges that affected its usage, that is, human resource and decision making challenges. The study is of great importance to KEMSA, Kenyan government and donors and will assist in identifying areas of improvement in Logistics Management Information System process.

5.4 Limitation of the study

The study was limited to fifty respondents for consistency purpose and because LMIS was their daily operation system. The fifty respondents also had a busy nature due to their work this being the third month in the Kenya government financial year calendar. Of the 50 respondents, 10 respondent had incomplete and blank questionnaires since didn't have time to respond and for others they assumed that LMIS behaved like other information systems such as ERP and WMS as a result some of questionnaires became irrelevant to the study since the answers made were did not reflect on what was being researched on.

The researcher over came the challenges by explaining the importance and benefit of the study to them.

5.5 Recommendations

Based on the results of the study many may not be aware that information system effectiveness is not only as a result by information system factors as concluded by Deleon and Mclean (2003) that there are six distinct aspects of information systems namely;

system quality, information quality, Service quality, Usage, user satisfaction, and Net benefit that show information effectiveness. Other corresponding factors, that is, inbound logistics, performance management, logistics cost and inventory control also influence its effectiveness thus a further research should be recommended to enhance more studies on information system effectiveness.

The study also recommends that KEMSA should look at the issue of human resource and decision making in ensuring LMIS standards meet the users' needs.

5.6 Suggestion for further study

The study suggests that future researchers should do the same using other factors not only the information system factors but from other corresponding factors that influence the effectiveness of the information systems.

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APPENDICES

APPENDIX 1: QUESTIONNAIRE

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

The following questions are designed to assess the effectiveness of the Logistics Management Information Systems (LMIS) in the Public Health Sector. At the end of the survey if you wish to receive the summary of the findings please click "Yes" under the relevant question.

Please answer all questions

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

PART A: DEMOGRAPHIC PROFILE (*Tick where appropriate*)

1. Education level: ☐ Diploma☐ Bachelor Degree ☐ Master Degree ☐ PHD

Other (Specify)……

2. How many years have you been employed by organization?

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

3. Job Management level: ☐ Top ☐ Middle ☐ Low

PART B: LMIS Effectiveness in terms of Information System Factors

4. **The following statements ask you to:**

Assess the LMIS effectiveness at work. It will look at 6 Dimensions (system quality, information quality, service quality, Usage, user satisfaction and Net benefit) of Information system.

Please mark the number with an (√) that best rate your evaluation as indicated below. (Use scale from 1 to 5)

Where 1= Not at all, 2=Small extent, 3= Moderate extent, 4=Large extent and 5=Very Largeextent

System Quality	**Examples**	**Rating**				
		1	2	3	4	5
How good is LMIS in terms of system quality	Easy to use					
	User friendly					
	Compared to other computer software is easy to learn					
	I find it easy to get LMIS to do what I want it to do					
	It is easy for me to become skillful at using LMIS					
	I believe that LMIS is cumbersome to use.					
	My using LMIS require a lot of mental effort.					

Information Quality	**Examples**	**Rating**				
		1	2	3	4	5
How good is LMIS in terms of Information quality	LMIS output is presented in a useful format.					
	LMIS accuracy is of satisfaction					
	LMIS Information is important and helpful for work					
	LMIS information clear					
	LMIS accurate					
	LMIS provide sufficient information					
	LMIS information needed is on time					
	LMIS provide up to date information					
	LMIS provide reports that seem to be just about exactly what you need					
	LMIS provide the precise information you need					
	LMIS information content meet your needs					

User Satisfaction	**Examples**	**Rating**				
		1	2	3	4	5
How good is LMIS in terms of User satisfaction	LMIS adequately meets the information processing needs of your area of responsibility					
	LMIS is efficient					

	LMIS is effective					
	LMIS is satisfactory					

Usage	**Examples**	**Ratings**				
		1	**2**	**3**	**4**	**5**
How good is LMIS in terms of Usage	Using LMIS in my job enables me to accomplish my tasks more quickly.					
	Using LMIS improves my job performance.					
	Using LMIS in my job increases my productivity.					
	Using LMIS enhances my effectiveness in the job.					
	Using LMIS makes it easier to do my job.					

Service Quality	**Examples**	**Rating**				
		1	2	3	4	5
How good is LMIS in terms of Service Quality	LMIS is of satisfaction					
	LMIS is reliable					
	LMIS information is secure					
	LMIS prompt in response when queried					
	LMIS is helpful					

Net Benefit	Examples	Ratings				
		1	2	3	4	5
How good is LMIS in terms of Net Benefit	LMIS purchase has saved individual consumers time and money					
	Benefits, such as larger markets, supply chain efficiencies and customer responsiveness, yielded positive net benefits for KEMSA					
	LMIS provide cost effective services					
	LMIS support you in case of emergency					
	LMIS complete services delivery in an effective manner					
	LMIS is a success to every user					

PART C: LMIS Effectiveness in terms of Supply Chain Management Factors

To what extent has supply chain management factors affected LMIS effectiveness in doing the following?

Please mark the space below the relevant number with an (√) in the grid based on the response key below.

1. Not at all 2. Small Extent 3.Moderate extent 4. Large Extent

5. Very large extent

Supply Chain Management factors	**Examples**	**Rating**				
		1	**2**	**3**	**4**	**5**
Forecasting	LMIS estimates the quantities of the various commodities that will be needed by a facility for a specific period of time.					
	LMIS assist in decision making concerning Health commodities					
Warehousing	LMIS control stock inventory					
	LMIS record report data of minimum stock, Maximum stock, lead time and buffer stocks for the programs medicines					
	LMIS is able to adjust data on commodities stock outs					
Customer Service	LMIS help retain valued customers					
	LMIS record report data on lead time					

	LMIS assist in order turnaround time					
	LMIS assist in gathering facility consumption data					
	LMIS on customer complaints					
Logistics	LMIS shows logistics cost used					
	LMIS provides data reports on delivery of goods					
Production	LMIS help you manage product flow					
	LMIS assess production cost					

PART D: Challenges of LMIS Usage in the Public Health Sector

This section seeks to establish the challenges of LMIS usage in the public Health sector.

Please tick one answer accordingly.

	Challenges	**Strongly disagree**	**Disagree**	**Not Sure**	**Strongly Agree**	**Agree**
1	Lack of enough resources e.g. budget, personnel					
2	Resistance by company employees					
3	None involvement of the users in the system design and implementation					
4	Obsolete hardware and software					
5	Lack of training personnel					
6	Lack of proper planning					

Summary of findings: **Yes** ☐ **No** ☐