

# THE INTERNATIONAL JOURNAL OF BUSINESS & MANAGEMENT

## Supply Chain Optimization and Service Delivery in Selected Humanitarian Organizations in Kenya

Miriti Mutugi Peter

Student, Department of Management Science, Kenyatta University, Kenya

### Abstract:

*Humanitarian needs across the globe are at an unprecedented level with the numbers increasing every year owing to climate change, conflict and human activities. In Kenya, the most affected people are those living in the arid and semi-arid regions which account for around 80% of the total landmass and an estimated 30% of the total population. The regions are hardest hit by floods and drought due to inadequate land cover and infrastructural deficits resulting from historical marginalization. Humanitarian organizations are therefore at the center of delivery of services to this category of people. Efforts have been made by various humanitarian players ranging from process automation, adoption of better transport and distribution practices and inventory management automation. However, there still exist supply chain challenges touching on service delivery; this study seeks to establish the effect of supply chain optimization on service delivery in selected humanitarian organizations in Kenya. Supply chain optimization addresses these challenges by giving special focus to four specific aspects of the chain that may have effect on service delivery levels, these include; inventory management, strategic sourcing, technology and transport and distribution. The study was anchored on the following theories; resource-based theory, social network theory, time in transit theory and goal setting theory in bid to address the existing research gaps. The study adopted descriptive design and used census survey sampling method considering the fact that only a population of 28 is under consideration. Data was collected using self-administered questionnaire with open and closed ended questions. Descriptive statistics such as percentages, mean, standard deviation and frequencies were used to estimate all quantitative variables. Multiple regressions analysis was used to analyze the data collected and the same presented in form of tables and graphs. The study findings revealed that supply chain optimization influences service delivery in selected humanitarian organizations in Kenya to a great extent. The study also revealed that most aspects of supply chain optimization relied upon technology to function optimally with transport and distribution being the most influential supply chain optimization concept. Inventory management, strategic sourcing and technology were also found to have a positive and statistically significant relationship with service delivery. The study recommends that humanitarian organizations integrate supply chain functions using technology to enhance efficiency and accountability as well as build human resource capabilities to be able to deal with the modern-day supply chain challenges.*

**Keywords:** Supply chain optimization, service delivery, humanitarian organizations

## 1. Introduction

### 1.1. Background of the Study

Globally, it is estimated that around 134 million people are in need of humanitarian aid (GHO, 2018). This situation is further complicated by the fact that around 1 billion people around the world lack basic identification (World Bank, 2018), a good number domiciled in sub-Saharan Africa. Lack of identification greatly hampers the ability of this population to take part in social, economic and political life. According to the World Disaster Report (2018) humanitarian action should be non-discriminative, however people must first be 'visible' to be identified and accessed. The World Economic Forum's Global Risk Report (2018) states that, geopolitical and environmental risks increased exponentially from 2017 to 2018. This is expected to be replicated in the coming years.

Based on the UN-led Humanitarian Response Plans (2017), Syria, DRC, South Sudan, Afghanistan and Ukraine were among the hardest hit countries with affected populations of 13.6 (67%), 13.1 (56%), 7.6 (82%), 7.4 (49%) and 4 (60%) million people respectively. Closer home, the Global Humanitarian Assistance Report (2018) indicated that Kenya had a population of 5.6 million people in need of humanitarian aid representing 12% of the total population.

In light of the above facts, the spotlight has turned on humanitarian organizations and specifically the humanitarian supply chain upon which humanitarian organizations are dependent. There is need for them to adopt techniques that will optimize the supply chain to enable efficiency in the flow of relief goods to disaster areas. Supply chain optimization is thus a formidable tool that can be used to enhance service delivery in humanitarian organizations (Parwanto, Mohorosi & Oyama, 2015).

According to Wassenhove (2006), humanitarian relief is 80% logistics; for the intended operational objectives to be achieved therefore, it is important for effective supply chain management techniques to be adopted. In his view, the

supply chain function in humanitarian efforts will determine success or failure. Humanitarian efforts are generally characterized by uncertainty and complexity, making it extremely important for humanitarian organizations to give special focus to supply chain management.

Supply chain optimization is an important tool in the realization of humanitarian efforts; mobilization of people, resources, skills and knowledge depend on how effective the supply chain functions (Wassenhove, 2006). For sustainability and competitiveness, humanitarian organizations must consistently optimize their supply chain to adopt more efficient and cost-effective processes that will give them an edge in their operations (Abidi, Leeuw & Klumpp, 2014). For the desired levels of service delivery to be realized, there has to be a high level of coordination among the various stake holders affecting the supply chain; donors, the government, Aid agencies, organizational interests and the logistics expertise (Balcik, Beamon, Krejci, Kyle & Magaly, 2010).

#### 1.1.1. Service Delivery

Services are intangible business activities that do not result in ownership or be stored. The quality of service has a direct effect on the satisfaction of customers pushing for the need to have a customer focused service (Galetzka, Prunyn, Verhoeven & Pieterse, 2006).

According to Longenecker and Scazzero (2000) the quality of service will reflect on the overall performance of the organization including increased customer satisfaction and employee morale. Effective service delivery therefore is at the heart of humanitarian organizations' competitiveness and sustainability. Service delivery within supply chain can be achieved through continuous development of capabilities needed to provide the intended services and offering solutions that offer a competitive edge in the delivery of services (Ojasalo & Gronroos, 2017).

Measurement of service delivery, a critical component in humanitarian organizations can be achieved through evaluation of the following factors; the response time which is mainly pegged on the supply chain strategies adopted, flexibility of the organization which is determined by the response rate to various disasters, the rate at which the intended objectives are met which includes the number of lives saved and the level of efficiency which can be determined by how well an organization utilizes its resources through adequate planning (Beamon & Balcik, 2015).

Schiffing and Piecyk (2014) delved into the aspect of service delivery measurement in humanitarian organizations in two ways; donor expectations and direct beneficiaries. Donors majorly focus on financial reports, media reports and overall disaster response. On the other hand, in the case of direct beneficiaries, there has to be evidence to show improved life situation or input and output measures that capture supply chain efficiency.

This study has adopted response time, rate at which intended objectives are met, supply chain input and output and the number of lives touched as the measures for service delivery. This decision is informed by the fact that the identified parameters are best suited to determine supply chain efficiency as an effect of optimization.

#### 1.1.2. Supply Chain Optimization

A supply chain is a set of firms linked by one or more upward and downward streams of goods and services, cash flow and information from end to end. On the other hand, supply chain management is the strategic coordination of traditional business functions within and without organizations with the intent of enhancing performance (Mentzer, Dewitt, Keebler & Min, 2001)

According to Carter, Rogers and Choi (2015) supply chain optimization refers to the science and art of designing a comprehensive qualitative and quantitative strategic view of the entire organization's supply chain. By analyzing supply chain networks, organizations will be in a position to bring to the fore different quantitative matrices regarding various aspects of the supply chain that will make the network function optimally.

The Pareto principle (80/20 rule) advanced by Vilfredo Pareto holds that for many events, around 80% of the effects come from 20% of the causes. From a supply chain point of view, 20% of the aspects in any supply chain will contribute to 80% of the problems in the network. It is therefore important to pursue optimization from a data analysis angle where focus can be put on the most critical areas of the supply chain for optimal performance (Simchi-Levi, Bramel and Chen, 2014)

Effective supply chain management when employed in any organization will create efficiency and give a competitive edge over other entities (Hassini, 2008). This is more pronounced in humanitarian organizations that rely heavily on the success of their supply chain. Soni & Kodali (2010) explored various supply chain optimization concepts that include; sourcing, logistics, inventory management, information flow and facilities. On the other hand, McLaren & Vuong (2008) emphasized on the importance of technology use in supply chain as a factor that promotes efficiency. This study focuses on four main concepts; inventory management, strategic sourcing, technology and transport and distribution.

Inventory management refers to all activities undertaken to ensure that end users have the needed product or service at their convenience. The inventory function coordinates the sourcing and the transport and distribution functions through specification of size and placement of stocked items (Oballah, Waiganjo & Wachiuri, 2015).

Policies touching on the inventory resource have a great impact on the efficiency of any supply chain; demand fluctuations and costs associated with stock outs greatly affect the efficiency of any supply chain (Ji & Zhu, 2016). Inventory management units should therefore be strategically stationed at different points within a facility or within a supply chain to safeguard operation flow.

Strategic sourcing is a coordinated and integrated approach to leveraging targeted spends with specific vendors that create value and knowledge in the customer-supply interface (Engel, 2004). It is important to get suppliers that will blend in with the existing structures for a seamless flow of activities within the supply chain. For concepts like JIT to be

implemented, there must be a great deal of collaboration between the organization and the supplier; effective sourcing techniques bring out such opportunities that give the supply chain a competitive edge (Kotabe & Murray, 2004).

Technology plays an integral part in the success of any supply chain; this has received a boost in the increase in internet connectivity world over and especially in the sub-Saharan Africa. According to the Huawei Report (2018) on global connectivity index, Kenya emerged top after Egypt on internet connectivity. Some of the areas that technology can be used in supply chain management include; Radio Frequency Identification (RFID), Electronic Data Interchange (EDI), Geographical Positioning System (GPS) and Enterprise Resource Planning (ERP). A technology enabled supply chain ensures a seamless flow of information and materials which in turn reduce coordination costs and transactions risk (Sanders and Premus, 2011). However, Brynjolfsson, Hitt and Yang (2014) hold that for technology to work, it must be matched with effective business processes that support organizational strategic goals.

Transport and distribution involve the movement of goods and people from one point to another using one or more modes within the supply chain with consideration to the process of planning, implementing and controlling procedures for efficiency (Stock & Lambert, 2001). Decisions surrounding the choice of mode or a combination of modes that will give the most desirable outcome are critical in supply chain (Tseng, Verhoef, Jong, Kouwenhoven & Hoorn, 2009). The most common modes include: road, air, rail, marine and pipeline.

### 1.1.3. Humanitarian Organizations in Kenya

Humanitarian organizations are entities responsible for prompt and efficient response to human needs brought about by natural disasters or conflict. According to the International Organization for Migration (IOM) Humanitarian Compendium (2018), towards the end of 2017 Kenya was home to the third largest number of refugees in Africa behind Ethiopia and Uganda. In the same year drought struck the northern part of Kenya triggering a hunger crisis that required humanitarian interventions. Some of the humanitarian organizations operating in Kenya that responded include; the UN, USAID, World Vision and CARE international among others.

Statistics by GFDRR (2018) indicate that around 4 million people in Kenya get affected by floods or draught in every seasonal cycle. According to the UNICEF (2018) annual report, a total of 300 thousand children were accessed with lifesaving health interventions and 474 thousand refugees were accessed by the UN high commission for refugees in Dadaab, Kakuma and urban areas UNHCR (2019). KRCS on the other hand directly reached 1.1 million people through disaster response and 2 million people through long term development programs; this is according to the KRCS annual report (2018).

Supply chain plays a key role in the actualization of humanitarian efforts in the country. According to Kamau (2013) study on humanitarian supply chain management in Kenya, the UNHCR supply chain is divided into procurement and contract, logistic support and inventory sections. The UNICEF supply chain has the budgeting and planning, procurement, delivery and clearance, warehousing and distribution, delivery and clearance whereas KRCS has a supply chain management department responsible for procurement, logistics, warehousing and business development functions.

Kaluki (2015) identified service delivery challenges facing humanitarian organizations in Kenya which include lack of a coordinated supply chain, lack of clear performance measurement indicators and personnel. Nyamu (2012) on the other hand identified inaccessibility due to inadequate transport modes, domestic barriers, demand uncertainty and cost implications.

### *1.2. Statement of the Problem*

Humanitarian organizations play a pivotal role in the advancement of human welfare. To achieve this objective organizations, go to great lengths to make sure that the intended service delivery levels are achieved. However, there are underlying challenges that hamper these efforts, Kamau (2013) identified the inability to anticipate disasters, lack of integration between supply chain function and organizational systems, demand uncertainty, poor infrastructure in disaster areas and financial constraints. Kaluki (2015) on the other hand singled out lack of supply chain coordination, absence of performance indicators and expertise. Nyamu (2012) pinpointed lack of information integration, poor transport infrastructure, technological deficits, ambiguous service delivery objectives and coordination and management challenges.

Efforts have been made to ameliorate some of these challenges, according to Ojwang (2016) humanitarian organizations made a significant investment towards automation of service delivery efforts (71% of respondents). USAID delivery project (2014) also shows efforts towards optimization of supply chain design, network and transport in various operations around the globe to enhance service delivery. Onyango 2016 indicated there being significant efforts towards inventory management among various humanitarian organizations operating in the country.

Supply chain optimization as anchored on the four concepts; inventory management, strategic sourcing, technology and transport and distribution will seek to address the above identified challenges. Granting special focus to specific critical areas of the supply chain as identified by the concepts, will give impetus to the chain offering efficiency and optimal outcomes which will in turn translate to the realization of the desired service delivery levels.

According to the Kenya Natural Disaster Profile by the UNDP (2004), ASAL account for more than 80% of Kenya's total landmass. Apart from the regions being prone to extreme weather conditions like drought and floods, the areas also suffer significant infrastructural deficits as a result of historical marginalization. The residents of these regions, who account for around 30% of the total population, are largely nomads which further complicate service delivery efforts. An estimated 5 million people are in need of humanitarian aid in the country every year (GHAR, 2018).

Moller and Paulsson (2008) examined supply optimization for sourced products; however, the study only focused on the inbound logistics through direct procurement and outsourcing. Abedi and Zhu (2016) did a study on optimization

model for purchase, production and distribution in fish supply chain. The study was however limited to supply chain aspects relating to fish farming. Ozceylan and Paksoy (2013) discussed reverse supply chain optimization with disassembly line balancing where focus was placed on network optimization for waste management.

This study focuses on the ways and techniques that can be employed by humanitarian organizations operating in the country to ensure that their supply chains function optimally to achieve the desired service delivery levels. Specifically, the study addresses initiatives that can be undertaken in specific stages of supply chain to translate in a more efficient and reliable chain.

### *1.3. Objectives of the Study*

#### 1.3.1. General Objective

The general objective of the study was to establish the effect of supply chain optimization on service delivery in selected humanitarian organizations in Kenya.

#### 1.3.2. Specific Objective

- To determine the effect of inventory management on service delivery in selected humanitarian organizations in Kenya
- To establish the effect of strategic sourcing on service delivery in selected humanitarian organizations in Kenya
- To assess the effect of technology on service delivery in selected humanitarian organizations in Kenya
- To determine the effect of transport and distribution on service delivery in selected humanitarian organizations in Kenya

### *1.4. Research Questions*

The study will seek to answer to the following questions.

- How does inventory management affect service delivery in selected humanitarian organizations in Kenya?
- How does strategic sourcing affect service delivery in selected humanitarian organizations in Kenya?
- How does technology affect service delivery in selected humanitarian organizations in Kenya?
- How does transport and distribution affect service delivery in selected humanitarian organizations in Kenya?

### *1.5. Significance of the Study*

The findings of the study would be useful to players in humanitarian organizations, specifically; donors, decision makers in humanitarian organizations, researchers and the government. Donors have an interest in making sure that the limited resources available reach as many people as possible, by creating efficiency through supply chain optimization humanitarian organizations can have a case for increased funding based on improved levels of service delivery. Humanitarian decision makers would be guided by this study in resource allocation decisions whereas researchers may have an opportunity to critique the study and build on the knowledge base. The government can be guided by this study in policy formulation on matters concerning humanitarian organizations operating within the Kenyan borders.

### *1.6. Scope of the Study*

The study was limited to humanitarian organizations operating in Kenya and focused on four main supply chain optimization concepts; inventory management, strategic sourcing, technology and transport and distribution with an aim to establish the influence the same has on service delivery. The study was supported by following theories; resource-based view theory, social network theory, systems theory, time in transit theory and goal setting theory. The study was conducted within the year 2019 and targeted 28 humanitarian organizations operating in Kenya.

### *1.7. Limitations of the Study*

Some respondents did not have adequate time to fill the questionnaire due to their busy schedule; this was ameliorated by the drop and pick method adopted by the researcher. Time was a constraint; as a result, the researcher dedicated time to ensure that the study was completed within the stipulated period and that it met the threshold for publication. Some organizations had reservations about divulgence of confidential information in the targeted population; the researcher provided a letter from Kenyatta University and NACOSTI confirming that the research was purely for academic purposes. The researcher also set aside significant resources to cater for all the expenses associated with the study.

### *1.8. Organization of the Study*

Chapter one which is foregoing contains the study background which focuses on the global, regional and local aspects of the study. It also gives the research objectives, significance of the study, scope and limitations of the study. Chapter two focuses on existing literature on supply chain optimization and service delivery backed with relevant theories that support the identified variables. Chapter three provides the methodology used to conduct the study followed by chapter four which presents data analysis, presentation and interpretation of findings. Chapter five concludes the study with a summary of the findings, conclusions and recommendations.

## 2. Literature Review

### 2.1. Introduction

This chapter looks into the existing literature on supply chain optimization and the influence the same has on the delivery of services in selected humanitarian organization in Kenya. This includes all available material on the subject including research done on the subject and other topics relating to humanitarian organizations in Kenya. This chapter also seeks to identify the various theories that support the optimization concepts identified. It also addresses the research gaps identified and the conceptual framework.

### 2.2. Theoretical Review

The study was anchored on the following theories: Resource Based View theory, Social Network theory, Systems Theory, Time in Transit theory and Goal Setting theory.

#### 2.2.1. Resource Based Theory

The theory was first advanced by Penrose (1959) in her book (*The theory of the growth of the firm*). According to the theory, an organization will gain competitive advantage if it effectively deploys the right mix of tangible and intangible resources heterogeneously in its operations flow (Rungtusanatham, Salvador, Forza & Choi, 2003). Firms apply different levels of focus on different resources that they control to create the bundle of resources that best suits their goals and objectives. The resource choice is always informed by the strategy an organization formulates; the goal therefore is to have a resource mix that is not replicable.

Humanitarian supply chain through strategic combination and deployment of select resources like technology and personnel enhance realization of organizational goals and objectives. Competitive advantage stems from an organization's internal resources and capabilities (Huang & Cao, 2016).

However, the resource-based theory has its limitations; the resource under consideration must possess certain characteristic qualities for there to be a competitive advantage that is sustainable. The resource must add value to the organization in terms of efficiency; it must be differentiated to give a competitive edge, the resource must be inimitable to avoid replication by competitors, It must be tailored to the firms specific needs; imperfectly mobile and finally the resource must be hard to substitute (Peteraf & Bergen, 2003).

This theory supports the inventory management concept. Based on this theory inventory management efficiency can be assessed in terms of carrying cost, inventory turnover, return on investment and days in inventory.

#### 2.2.2. Network Theory

Barnes (1954) a sociologist, was the first to study the social networks in the field. The social network theory defines relationships of individuals within a system and links the same with other actors. A social network can either be online or offline and are characterized by nodes and ties; nodes being the elements of the network that act and ties being the relationship between the actors (Rodriguez, 2016).

Supply chain networks are particularly complex and heavily rely on the relationships of network members to succeed. The network theory best examines how organizations are linked together either through executives and other employees at different levels within their respective networks (Newman, 2003). Seamless flow of activities within supply chain, relationships are extremely important; this is promoted by the network theory. Humanitarian organizations rely on networks for information gathering and drafting of policies for disaster response (Lincoln, 2015).

The theory has limitations; the identification of the critical links that will interlink processes and critical partners to create a network is a challenge. The success of the theory is also dependent on 'contact' to create the ties that form the network. The strength of the network is dependent on the frequency of contact, duration of the interaction and the level of energy invested in building the relationship (Lui, Sidhu, Beacom & Valente, 2017). Strong networks enable supply chains to respond effectively to changes in the areas of operation like people's needs and competitors' reactions; this enhances relations which promote efficiency (Bantham, Celuch & Kasouf, 2003).

Based on this theory strategic sourcing can be measured in terms of cost savings, purchased product quality, purchase process efficiency, lead time and vendor quality.

#### 2.2.3. Systems Theory

The theory was first advanced by Bertalanffy (1969) as the general systems theory. In his findings he concluded that, rather than focusing on specific properties of an entity's elements, one should instead focus on the arrangements and the relations between the parts that relate into a whole. Systems with similar components may still function and act differently as a result of choice of component arrangement considered; the outcome is determined by the mode of interaction between the components. Most systems are open and are thus influenced by the environment they operate in causing them to mutate acquiring new qualitative properties. However, there must be a defined boundary separating the system from the environment it operates in; the boundary allows inputs and outputs in and out of the system (Helou & Caddy 2006).

In supply chain, the systems theory brings together the various components like inventory handling, sourcing, human capital, information flow, transport and distribution and finances to form the larger supply chain system (Faharani, Asgari & Davarzani, 2009)

The theory is limited to the extent that it assumes that all organizations are big with complex systems and overlooks the small organizations. The bigger the system, the harder decision making becomes because of the need to consult; systems pose the risk of being counterproductive if not well managed (Singh, Wen & Jain, 2017). As supported by this theory technology can be assessed in terms of the level of process automation, level of information flow, organizational flexibility and the extent to which it helps in resource planning.

#### 2.2.4. Time in Transit Theory

The theory was advanced by Tanaka (2010) based on the Japanese census of logistics. The theory creates a link within transport cost, distance and time in order to achieve timely deliveries. According to Tanaka, there is a cost influence to distance and time across the modes of transport; businesses are likely to incur higher cost in short distance deliveries than longer ones on road, rail and marine transport (Tanaka, 2010). Anderson and Wincoop (2004) opined that transport cost has a huge impact on international trade to an extent that it can hinder or promote the same. The impact of the transport and distribution function on supply chain therefore cannot be over emphasized.

The theory has limitations; it is best suited for large organizations that have a significant spend on transport where a balance between transport costs and distance and time can be realized. In addition, the theory is pegged on the availability of data to aid in decision making (Tanaka, 2010).

This theory greatly advances the transport and distribution function as a vital tool in the creation of access to services. Transport and distribution can be measured in terms of transport costs, time in transit, supply chain reliability and the extent to which the function adopts transport management practices.

#### 2.2.5. Goal Setting Theory

The theory was first put forward by Locke (1960) based on the empirical studies of Mace (1935). The studies were later advanced further with the development of the high-performance cycle by Locke and Latham (1990) and Latham, Locke and Fassina (2002). The model opines that specific high goals will translate into high performance as opposed to vague and easy goals which result in poor performance. Goal setting involves putting in place an action plan designed to motivate and give direction to groups or individuals to achieve specific goals. The theory can thus be used to enhance service delivery levels in humanitarian organizations in Kenya.

The theory has been critiqued to the extent that people may choose to focus on the goal and overlook the aspect of quality; goals and quality of output must be synchronized. The theory also encourages tunnel vision approach to issues where people focus so much on the goal and overlook other important aspects around them (Scobbie, Wyke, Dixon, Brady, 2015).

Service delivery as cultivated by this theory can be measured in terms of the number of lives touched by humanitarian efforts, response time, supply staff competence and organizational flexibility.

### *2.3. Empirical Review*

Supply chain optimization concepts adopted by an organization may have effect on service delivery levels. Organizations that rely on supply chain may find it necessary to promote efficiency through optimization. There are various studies done on supply chain optimization and service delivery.

#### 2.3.1. Inventory Management

Inventory management refers to all activities undertaken to ensure that end users have the needed product or service at their convenience. Osei (2015) interrogated the effect of inventory management practices on service delivery at St. Martin's hospital, Agroyesum Ghana. The study adopted a descriptive survey design and targeted a population of 235 employees pooled from various departments within the hospital. Using purposive and convenience sampling technique, the study sampled 60 employees from finance, stores, records and pharmacy units. The study focused on inventory management practices which included; ABC analysis, economic order quantity, material requirement planning, manufacturing resource planning, enterprise resource planning, distribution resource planning and just-in-time system. The study deduced that inventory management practices had a great effect on service delivery at the institution; this was indicated by a mean of 6.26 and a standard deviation of 0.681. The study also identified long procurement procedures, insufficient funds and inadequate training as some of the challenges affecting inventory management. However, the study was limited to one institution thus denying the findings the effect of comparability. The study also failed to address other factors relating to inventory management that affect service delivery.

Wanyonyi (2017) interrogated inventory management practices and service delivery of major supermarkets in Kenya. The study targeted a population of 17 which was a census of all large supermarkets occupying 1000 to 5000 square feet and adopted expressive research design. The study focused on inventory management practices which included vendor managed inventory, economic order quantity, just in time and ABC system and how the same affects service delivery. The study deduced that most supermarkets had adopted vendor managed inventory for high value items and just-in-time for perishable items. ABC system was also used with the high value items being given special focus by use of sophisticated security mechanisms. The regression analysis revealed that the identified variables contributed to a 55.8% of service delivery levels, the findings also revealed that the practices improved supplier-buyer relationship. The study however discriminated against the small supermarkets yet inventory management challenges are more pronounced when the stock levels are low.

Onyango (2016) examined inventory management practices and service delivery of health humanitarian organizations in Kenya. The study targeted a population of 10 organizations which was a census of all the health

humanitarian organization and adopted a cross sectional descriptive design, to enable the researcher make comparisons from a broad category of humanitarian organizations. The study found out that inventory management practices like re-order level, economic order quantity, just in time, vendor managed inventory and activity-based costing contributed greatly to the performance and service delivery levels of humanitarian organizations in Kenya. However, the study did not exhaust all the inventory management practices that can be adopted by humanitarian organizations to enhance service delivery. The study greatly supports the inventory management concept as adopted by this study which considers inventory as a critical aspect in service delivery.

### 2.3.2. Strategic Sourcing

Strategic sourcing is a deliberate collaborative and structured approach to leverage specific spends across locations to different select capable vendors that can offer advantage and experience in the buyer-vendor interface. The sourcing function has over the years evolved from a passive and reactive administrative function to a proactive and strategic function. Maurice (2014) interrogated procurement practices influencing service delivery: a case of Kenya power. The study targeted a population of 7000 Kenya power employees pooled from different deports across the country out of which 160 were sampled using random stratified sampling; the respondents were pooled from procurement, customer service and marketing, finance and audit and technical units within the organization. The study focused on procurement policy, procurement planning and sustainable procurement practices as the aspect that influence service delivery. The study deduced that procurement practices did have an effect on service delivery within the organization, of all the practices fronted by the study, sustainable procurement had the greatest impact on service delivery with a respondent agreement rate of 88.8%. Despite the research being a case study, which limited comparability, data collection was centered at the head office. This may have skewed the data to represent service provision within the urban areas at the expense of the rural areas.

Thuo and Njeru (2014) examined effects of public procurement reforms on service delivery at national spinal injury referral hospital, Nairobi. The study targeted a population of 224 and sampled 67 respondents using stratified random sampling. The study identified tender committee transparency, fair competition, transparency of the procurement process, tender committee knowledge of the public procurement and disposal act. In conclusion the study revealed that the identified aspects had a positive effect on the levels of service delivery, however prolonged procurement cycles were identified as an impediment to service delivery because it resulted in stock outs in the facility. The research was however limited to one public institution, the study needed to spread the findings across various public institutions for better understanding of the subject under consideration.

Nderi (2015) delved into procurement planning strategy and service delivery: a case of medicines sans frontiers Kenya supply unit. The case study targeted a population of 110 pooled from the organization's suppliers, clients and staff where a sample of 10 was selected using the stratified random technique. Using descriptive survey, the study focused on procurement planning strategies which included procurement planning policy, resource availability and procurement and how the same affects service delivery. The study concluded that procurement planning positively affected service delivery; it helped in the shortening of lead time on deliveries, enhanced flexibility and consistency in service delivery and resulted in reduced costs. However, the study was restricted to planning as an aspect of sourcing as opposed to interrogating procurement in totality. Sillanpaa, Sillanpaa and Shahzad (2015) conducted a literature review study on supplier development and buyer-supplier relationship strategies. The study which only gave theoretical proof, identified specific aspects that develop the sourcing function in organizations namely; competitive pressure, evaluation and certification systems, incentives and direct involvement. According to the study, competition improves quality and supplier performance, evaluation and certification ensures performance and motivates suppliers, incentives like prompt payment and guaranteed business ensures supplier development whereas direct involvement promotes supplier buyer strategic partnership and guarantees quality. The study is however theoretical with no scientific backing based on specific raw data findings.

### 2.3.3. Technology

Technology in supply chain refers to the hardware and software that captures, analyses, supports and makes information available wherever it is needed within a network. Technology is categorized into three categories; automatic identification technology, information technology and communication technology. Ojwang (2016) examined the use of information technology on humanitarian logistics of relief organizations in Kenya. The study targeted a population of 53 organizations based on Enterprise Human Resource and Payroll (2015) which showed that 53 such organizations operated in Kenya. The study adopted a census sample in consideration of the fact that the target population was small. The study assessed various information technology uses like automation of processes, organizational flexibility, information flow and resource planning. The findings established a positive relationship between technology use and the effectiveness of relief logistics; technology use resulted in improved coordination levels, reduced lead times, improved quality and cost efficiency. Due to the ever-changing face of technology, the study may not apply in the next few years; furthermore, the study will need to be replicated in other sectors to assess the level of pervasiveness. Onobrakpeya, Nana and Odu(2018) interrogated service delivery through information and communication technology in the Nigerian manufacturing industry. The study targeted a population of 515 employees of different private listed companies and sampled 225 employees using the stratified random sampling method. The study examined three indicators of information communication and technology aspects namely: telecommuting, teleconferencing and electronic mail. The findings indicated that the indicators had a positive impact on service delivery by creating efficiency through faster communication, reduced costs and flexibility which enhanced employee performance through motivation. The study was

however limited to the information and communication category of technology leaving other technological aspects that enhance service delivery. The research findings also need to be tested against other sectors to determine cross application. Auramo, Inkilainen, Kauremaa, Kemppainen, Karkkainen, Laukkanen, Sarpola and Tanskanen (2014) conducted a literature review study on the role of information technology in supply chain management. The study focused on transaction processing, supply chain planning and collaboration and order tracking and delivery coordination. The empirical data collected indicated a positive relation between the technology variables and supply chain management. Transaction process automation reduced cost, increased volumes being transacted and eliminated human errors. Supply chain planning supported cross-organizational collaborations whereas order tracking and delivery coordination helped in the consolidation and tracking of goods in transit. The study was however not backed with raw data to support the empirical findings deduced.

#### 2.3.4. Transport and Distribution

Transport is the movement of people, goods or materials from one place to another using one or more transport modes. Griffis and Goldsby (2015) examined transportation management system: an exploration of progress and future prospects. The study adopted an electronic survey methodology and targeted a population of 1651 which was a census of subscribers of *Supply and Demand Chain Executive* magazine in the United States. The study focused on total network and lane decision, carrier selection, service negotiation, service evaluation and dock level and over-the-road decisions. The study deduced that the complexity of present-day transport management necessitated players in the transport sector to adopt transport management systems to better manage logistics aspects of their organizations. It also emerged that most organizations believed that the risk of failure to adopt transport management system outweighed that of adoption, the return on investment was found to be quick and certain. The findings also revealed the need for inter-operability of the adopted management system with other aspects within the supply chain for strategic and sustainability purposes. However, the study failed to address other factors outside the transport function which have influence on the success of the transport function within the supply chain.

Kiraga (2014) examined transport management practices and performance of humanitarian organizations in Kenya. The study adopted the census technique targeting all humanitarian organizations involved in the distribution of aid in Kenya and adopted a descriptive design. The study interrogated various transport management practices which included carrier management, load planning and optimization, preparing and execution of shipments, shipment practices, freight payment and audit and performance monitoring. The study revealed that, use of the identified transport management practices enhanced organizational performance in terms of faster response, reduced costs and timely and accurate deliveries. Transport alone however well managed may not guarantee performance of the entire supply chain; other aspects like inventory management, technology and resource management play a key role.

Strawderman, Eksioglu and Zhang (2011) examined the role of intermodal transportation in humanitarian supply chains. The study targeted a population of humanitarian organizations operating within the United States through an online survey and sampled 769 randomly. The study focused on the frequency of use of various transportation modes, the amount of intermodalism used, important factors to consider in disaster relief mode selection and the effect of organizational type and processes on utilized modes decision. The study revealed that intermodalism applicability was dependent on prevailing circumstances during disaster times where people and supplies have to be moved to disaster areas with little or no preparation. It also emerged that transport decision making was informed by organizational type and capability, cost, distance, type of supplies being transported and the modes available; every relief scenario was found to be unique requiring a unique transport approach. The study was however limited to the extent that it did not focus on one specific disaster to act as a reference point for all the respondents; this denied the study the ability to generate a focused and structured outcome.

#### 2.4. Literature Review Summary and Research Gaps

Scholar	Focus of Study	Methodology	Findings	Knowledge Gaps	Current Study Focus
Osei(2015)	Effect of inventory management practices on service delivery	Population of 235 and a purposive sample of 60 & descriptive survey design	Inventory management practices enhanced service delivery	The findings were limited to one institution	Inventory is viewed as a component of supply chain
Wanyonyi (2017)	Inventory management practices and service delivery	Census of 17 large supermarkets with an expressive design	Inventory management practices enhanced service delivery	The study did not address challenges facing smaller institutions	Data will be collected from a census of 28 organizations
Onyango (2016)	Inventory management practices and service delivery of health humanitarian organizations in Kenya	Targeted a census of 10 health humanitarian organizations in Kenya	Inventory management practices enhanced service delivery	Focus on a few inventory managements practices	Effect of inventory management in supply chain optimization



Scholar	Focus of Study	Methodology	Findings	Knowledge Gaps	Current Study Focus
Maurice (2014)	Procurement practices influencing service delivery: a case of Kenya power	Population of 7000 with a sample of 160 using stratified random sampling	Procurement practices influenced service delivery	Finding limited to the head office at the expense of rural service delivery	Procurement is a component of supply chain optimization
Thuo & Njeru (2014)	Effects of public procurement reforms on service delivery	A case study targeting 224 and sampled 67 through stratified sampling	Public procurement reforms enhanced service delivery	Study limited to one public institution	Effect of strategic sourcing on service delivery
Nderi (2015)	Procurement planning strategy and service delivery	A case with a population of 110 and sampled 10 using stratified sampling	Procurement planning enhanced service delivery	Study was limited to one aspect of procurement (planning)	Effect of strategic sourcing on service delivery
Sillanpaa, Sillanpaa & Shahzad (2015)	Supplier development and buyer-supplier relationship strategies	Literature review-based study	Good supplier management practices offer value to organizations	Literature review-based study with no raw data collaboration	Effect of strategic sourcing in supply chain optimization
Ojwang (2016)	Information technology in humanitarian logistics	Descriptive study with a census sample of 53 organizations	Information technology was used in delivery of services	The study overlooked other forms of technology in logistics	Use of technology on the entire supply chain
Onobrakpeya, Nana & Odu (2018)	Service delivery through information and communication technology in the Nigerian manufacturing industry	Target population of 515 and sampled 225 using random stratified method	Information technology had a positive on service delivery levels	Study was limited to information and communication technology	Effect of technology on the entire supply chain
Auramo, Inkilainen, Kauremaa, Kemppainen, Karkkainen, Laukkanen, Sarpola and Tanskanen (2014)	The roles of information technology in supply chain management	Empirical review study	Information technology helped in supply chain management	The study lacked scientific backing by way of raw data collection	Use of technology in supply chain optimization
Griffis&Goldsby (2015)	Transportation management systems: an exploration of progress and future prospects	Electronic survey with a census of 1651	Transportation management systems gave firms a competitive edge	Study overlooked external factors that affect the transport function	The role of transport in supply chain optimization
Kiraga (2014)	Transport management practices and humanitarian organizations performance in Kenya	Population of 1121 and sampled 340 through stratified sampling	Transport management practices had an impact on performance levels	The study overlooked other factors that affect performance in logistics	Transport as a supply chain optimization tool
Strawderman, Eksioglu and Zhang (2011)	The role of intermodal transportation in humanitarian supply chains	An online survey that targeted 769 randomly	Transport intermodalism optimized disaster relief chains	The study lacked a specific point of reference	Transport is viewed as a factor in the optimization of supply chain

Table 1: Literature Review Summary and Research Gaps

### 2.5. Conceptual Framework

The conceptual framework presents the supply chain optimization concepts and how they relate to service delivery in humanitarian organizations in Kenya. The independent variables included inventory management, strategic sourcing, technology and transport and distribution whereas the dependent variable was service delivery. Service delivery in humanitarian organizations can be determined by aspects like, the number of lives saved, how well resources are utilized, organizational flexibility and response time.

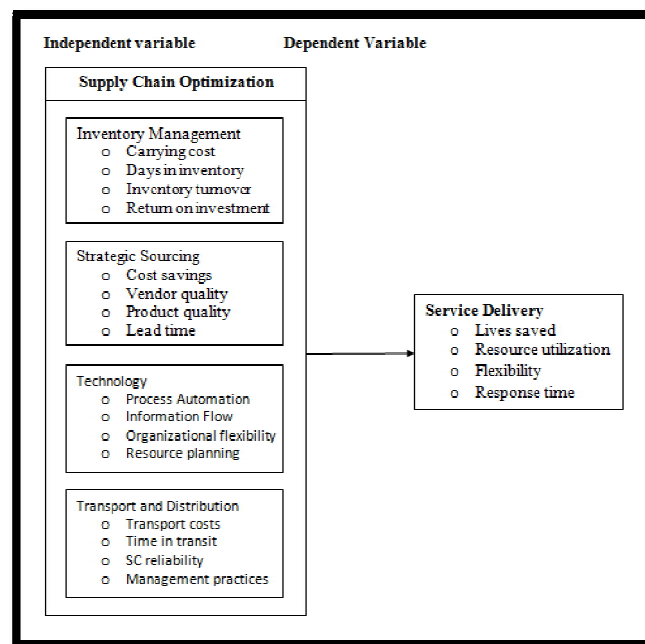


Figure 1: Conceptual Framework  
Source: Author (2019)

### 3. Methodology

#### 3.1. Introduction

This chapter presents the research methodology that was used to carry out the study. It outlines the research design, population considered, sampling design, data collection methods and analysis techniques.

#### 3.2. Research Design

The study adopted descriptive design. This choice was consistent with the conditions brought out by Ebrahim (2018) which are; that the subjects are measured once, that the intention is to establish relationship between variables and that the study may target a sample population which forms a valid basis for generalization of findings establishing relationship between variables.

#### 3.3. Target Population

Target population is a set of people, objects or events hypothetical or real that a researcher wishes to base results of a study (Robson & McCartan, 2016). According to the UN office for the coordination of humanitarian affairs OCHA (2019) there are 28 humanitarian organizations operating in Kenya. The study therefore targeted the 28 organizations (Appendix VI).

#### 3.4. Sample Size and Sampling Technique

A sample size is a representation of a given population selected through thoughtful considerations with an aim of making conclusions representative of the entire population. The study adopted the census survey method where all the 28 organizations were considered targeting various heads of supply chain and related units. The two choices were informed by the fact that the targeted population was small and the fact that supply chain heads are most knowledgeable in the subject under study respectively.

#### 3.5. Data Collection Instruments

Primary data was collected by use of self-administered questionnaire (appendix II) which consisted of both open and closed ended questions in form of Likert scale. The respondents responded by indicating their view on how strong they agreed or disagreed on specific questions to capture the intensity of their opinions. The questionnaire comprised of three parts: A, B and C. Part A consisted of general information regarding the respondent and the organization whereas the other parts focused on the research variables.

The researcher adopted the drop and pick method at a point agreed between the respondent and the researcher. This allowed the respondents ample time to fill the questionnaire.

#### 3.6. Pilot Test

##### 3.6.1. Validity

Validity is the relevance and correctness of the inference based on the findings of a study (Taherdoost, 2016). A pilot test is important in establishing the validity of the data collection instrument; this was done through face and content

validity where opinions regarding the questionnaire were sought from non-expert respondents and the study supervisor respectively. Construct validity was also done through factor analysis computation for all the study variables.

### 3.6.2. Reliability

Reliability is the extent to which a measure repeatedly displays stability and consistency (Taherdoost, 2016). For the reliability test the study adopted the internal consistency technique using Cronbach's  $\alpha$  (Alpha) where a value of 0.7 and above signified reliability (Taber, 2018). According to Marshall and Rossman (2015) a pilot group of 10% of the total target population is adequate for reliability test.

### *3.7. Data Collection Procedure*

Data was collected through a questionnaire which was self-administered, this gave the respondents ample time to complete the survey. The researcher obtained letters of authorization from Kenyatta University and NACOSTI to aid in the collection of data from the sampled organizations. Formal appointments were made with the sampled organizations to ease the data collection process through creation of rapport with the targeted respondents (Sekaran & Bougie, 2016).

### *3.8. Data Analysis and Presentation*

SPSS version 25.0 was used for data analysis. After the data collection process was complete, the data was reviewed for accuracy and completeness after which it was edited and coded for improved quality. Descriptive statistics which included percentages, standard deviation, mean and mode were employed for analysis using the statistical package for social sciences; the data is presented in summary form by use of statistical tables. Regression analysis was done for inferential statistics. The relationship between supply chain optimization and service delivery was established using the below regressions model:

$$S = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \varepsilon$$

Where:

S= Service delivery

$\beta_0$  = Constant Term

$\beta_1, \beta_2, \beta_3$  and  $\beta_4$  = Beta coefficients

$X_1$  = Inventory management

$X_2$  = Strategic sourcing

$X_3$  = Technology

$X_4$  = Transport and distribution

$\varepsilon$  = Error term

### *3.9. Ethical Considerations*

To guarantee confidentiality of the data collected, the researcher gave assurance to the respondents that the information obtained was purely for academic purposes. Access and consent were sought formally to ensure that all the engagements with the organization being sampled were formal. The researcher also made sure that the respondents participated out of their own volition; the researcher respected the wishes of those who did not wish to take part. Anonymity of the respondents and the sampled organizations was guaranteed by ensuring that no names were indicated on the questionnaire to avoid victimization. All communications relating to the research were done with utmost honesty and transparency devoid of any exaggerations about the aims and objectives of the study. The study also ensured that appropriate language was used in the formulation of the questionnaire to avoid offending the targeted population and focus groups.

## **4. Data Analysis, Presentation and Interpretation of Findings**

### *4.1. Introduction*

This chapter presents discussion of results and analysis of findings in bid to achieve the objectives of the study and form a basis for conclusion of the study. The main objective was to establish the effect of supply chain optimization on service delivery in selected humanitarian organizations in Kenya.

### *4.2. Response Rate and Demographics*

The study considered the following demographics among the selected humanitarian organizations: gender, level of education and age bracket.

#### 4.2.1. Response Rate

The study targeted 28 humanitarian organizations with respondents comprising of supply chain and related units' heads. Out of the 28 questionnaires issued, 21 were returned dully completed representing 75% of the total target population. According to Nulty (2008), a response rate of 50% is considered adequate.

Response Rate	Frequency	Percent
Response	21	75
Non-Response	7	25
Total	28	100

Table 2: Response Rate

#### 4.2.2. Gender of Respondents

	Frequency	Percent
Male	16	76.2
Female	5	23.8
Intersex	0	0
Total	21	100.0

Table 3: Gender of Respondents

From Table 4.2, 76.2% of the respondents were male, 23.8% female and 0% intersex. This indicates gender imbalance in the selected humanitarian organizations; the female percentage however lower is adequate and thus safe to conclude that views from all genders were accommodated by this study. No intersex respondent was captured.

#### 4.2.3. Level of Education

The study sought to establish the highest and lowest level of education of the respondents; the responses are summarized in Table 4 below.

	Frequency	Percent
Certificate	1	4.8
Diploma	5	23.8
Degree	12	57.1
Masters	2	9.5
PhD	1	4.8
Total	21	100.0

Table 4: Level of Education

According to Table 4.3, the majority of the respondents fell under the Degree category with a percentage of 57.1% followed by Diploma with 23.8%, Masters 9.5%, Certificate 4.8% and PhD 4.8%. This shows that the respondents could be relied upon to give accurate information regarding the subject under study.

#### 4.2.4. Age of Respondents

The respondents' age distribution is indicated in Table 5 below.

	Frequency	Percent
20-30 years	2	9.5
30-40 years	6	28.6
40-50 years	10	47.6
50-60 years	3	14.3
Total	21	100.0

Table 5: Age of Respondent

From Table 4.4, majority of the respondents fell within the 40-50 bracket represented by 47.6%, followed by 30-40 with 28.6%, 50-60 with 14.3% and 20-30 with 9.5%. This shows that the findings were well distributed across generations.

### 4.3. Pilot Study Results

#### 4.3.1. Reliability Analysis

Reliability is the extent to which a measure repeatedly displays stability and consistency. The Cronbach's alphas from the extracted factors are indicated below in Table 6.

Scale	Cronbach's Alpha	Items
Inventory Management	0.735	4
Strategic Sourcing	0.759	5
Technology	0.795	4
Transport and Distribution	0.828	4

Table 6: Reliability Analysis

Table 6 shows that all the items indicated reliability of 0.7 Cronbach's alpha and above which signifies a great degree of reliability.

#### 4.3.2. Validity Analysis

According to Cooper and Schindler (2006), validity is the degree to which the research instrument measures what was intended to be measured. Confirmatory Factor Analysis was employed to extract numbers that indicated appropriateness of the study variables in the construct to support the proposed research model. The validity is acceptable if the instrument contains a representative sample of the universe subject.

	Component				
	1	2	3	4	5
The firm makes deliberate efforts to minimize carrying cost	.568	.038	-.431	.070	-.521
The firm manages the number of days in inventory to minimize funds tied in stock	.682	-.049	-.164	.166	-.247
Inventory held is consumed continuously throughout the year	.658	.134	-.109	-.208	-.276
The firm maximizes benefit from the inventory used to justify holding stock	.116	.150	.152	.283	.438
The sourcing function makes deliberate efforts to minimize costs relating to product acquisition	.155	.069	.571	.418	-.539
The sourcing function continuously improves on the quality of vendors	.611	-.440	.337	.078	.049
The firm is conscious of the quality of products used in the delivery of services	.638	.306	.430	-.371	.029
The sourcing function continuously shortens purchase lead time	.604	.019	.061	-.437	.033
The firm has a sourcing strategy in place	.001	-.029	.787	-.015	.178
Most supply chain processes are automated	-.055	.030	.664	-.668	.013
Technology is used in the dissemination of information across the supply chain	-.641	.667	.062	.120	-.052
The firm utilizes technology to enhance organizational flexibility	-.739	.294	.325	.155	.084
The firm uses technology in resource planning	-.660	.387	.389	.190	.190
The firm continuously maintains manageable transport cost in creating access to service delivery	.562	.426	.371	.147	-.104
The firm balances various transport modes to minimize time in transit	.772	.370	.104	.131	.297
The form relies on the transport function to create access and connectivity within the supply chain	.732	.408	.142	.109	-.239
The firm employs transport management practices to create efficiency and better access	.498	.341	.031	.538	.387

Table 7: Component Matrix  
Extraction Method: Principal Component Analysis  
a. 5 components extracted.

Kothari (2004) prescribes a threshold of 0.4 construct validity for all factor analysis variables; all the 17 parameters observed passed this test.

#### 4.4. Descriptive Statistics

##### 4.4.1. Service Delivery

The respondents were asked to indicate their level of agreement on aspects relating to service delivery for the last five years.

	Mean	Std. Dev.
The number of lives saved has increased	2.6190	1.32198
There is better resource utilization	2.7143	1.18924
There is better organizational flexibility	2.7619	1.17918
Disaster response time has improved	2.7143	1.38358

Table 8: Trends of Aspects of Service Delivery

From table 4.7, the respondents agreed that for the last five years there has been better organizational flexibility as indicated by a mean of 2.76. Better resource utilization and improved response time followed with a mean of 2.71; increased number of lives saved came in last with a mean of 2.61.

The study also asked the respondents to give their recommendations on what should be done to enhance service delivery in humanitarian organizations in Kenya. The respondents indicated that services needed to be devolved closer to disaster prone areas for quicker response. It also emerged that humanitarian organizations needed to be better equipped to respond to today's humanitarian challenges. Issues concerning funding were also raised and it was suggested that humanitarian organizations find other ways to supplement donor funds to ameliorate budget deficits.

#### 4.4.2. Inventory Management

The study sought to establish the influence inventory management has on service delivery in selected humanitarian organizations in Kenya.

##### 4.4.2.1. Extent of inventory management on service delivery

The respondents were asked to specify the extent to which inventory management affects service delivery. The results are displayed in Table 9 below.

	<b>Frequency</b>	<b>Percent</b>
Not at all	2	9.5
Small extent	4	19.0
Moderate extent	4	19.0
Great extent	5	23.8
Very great extent	6	28.6
Total	21	100.0

*Table 9: Extent of Inventory Management on Service Delivery*

According to the findings, majority of the respondents agreed that inventory management did affect service delivery with 28.6% very great extent, 23.8% great extent, 19% moderate extent, 19% small extent and 9.5% not at all. This is in line with Miller (2012) who holds that stock administration framework adopted by an organization directly influences its gainfulness; humanitarian organizations stand to achieve the desired service delivery levels.

##### 4.4.2.2. Influence of Aspects of Inventory Management

The study also sought to establish the level of agreement on various aspects of inventory management and their influence on service delivery.

	<b>Mean</b>	<b>Std. Dev.</b>
The firm makes deliberate efforts to minimize carrying cost	2.1905	1.16701
The firm manages the number of days in inventory to minimize funds tied in stock	2.6667	1.23828
Inventory held is consumed continuously throughout the year	2.4286	1.20712
The firm maximizes benefit from the inventory used to justify holding stock	2.4286	1.32677

*Table 10: Influence of Aspects of Inventory Management*

From table 9, the respondents largely agreed that the organization managed the number of days in inventory to minimize tying funds in stock as indicated by a mean of 2.67. It was also indicated that inventory held was continuously consumed throughout the year as shown by a mean of 2.43, that the firm maximized benefit from inventory used to justify holding stock as shown by a mean of 2.43 and that the firm made deliberate efforts to minimize holding costs as indicated by a mean of 2.19. The results imply that there is need to strike a balance between holding stock levels that will guarantee un-interrupted service delivery and the need to manage cash flow by limiting costs associated with stock. This is in line with the works of Gonzalez and Gonzalez (2010) that emphasize on the use of re-order points to better manage inventory levels to avoid over and under stocking which may lead to a knock-on effect that may affect the entire supply chain.

The respondents were also asked to give their own opinions on how the aspects of inventory management affected service delivery. The respondents indicated that by keeping holding costs at manageable levels the organization was able to reduce risks and at the same time enabled adoption of inventory management practices like JIT, EOQ and VMI. This is in tandem with Ivanov, Tsipoulanis and Schonberger (2018) view that proper inventory management reduces holding costs to minimal levels and at the same time enhances efficiency.

#### 4.4.3. Strategic Sourcing

The second objective of the study was to establish the effect of strategic sourcing on service delivery in selected humanitarian organizations in Kenya.

#### 4.4.3.1. Extent of Strategic Sourcing on Service Delivery

The objective was to determine the extent to which strategic sourcing influences service delivery in selected humanitarian organizations in Kenya.

	Frequency	Percent
Not at All	2	9.5
Small extent	1	4.8
Moderate	2	9.5
Great extent	8	38.1
Very great extent	8	38.1
Total	21	100.0

Table 11: Extent of Strategic Sourcing on Service Delivery

As illustrated in table 10, 38.1% of the respondents indicated that strategic sourcing influenced service delivery to a great and very great extent. This was followed by 9.5% moderate, 4.8% small extent and 9.5% not at all. This is in agreement with Kotabe and Murray (2004) who posit that great levels of collaboration between the organization and suppliers form a basis for the use of concepts like JIT which give organizations a competitive edge and thus enhanced service delivery levels.

#### 4.4.3.2. Influence of Aspects of Strategic Sourcing on Service Delivery

The questionnaire gave the respondents an opportunity to indicate their level of agreement on various aspects strategic sourcing influence on service delivery in selected humanitarian organizations in Kenya.

	Mean	Std. Dev.
The sourcing function makes deliberate efforts to minimize costs relating to product acquisition	1.9524	.97346
The sourcing function continuously improves on the quality of vendors	2.4286	1.20712
The firm is conscious of the quality of products used in the delivery of services	2.3810	1.16087
The sourcing function continuously shortens purchase lead time	2.4762	1.12385
The firm has a sourcing strategy in place	3.2381	1.22085

Table 12: Influence of Aspects of Strategic Sourcing

Table 12 shows that the respondents strongly agreed on the importance of strategy in sourcing as indicated by a mean of 3.2, this was followed by a mean of 2.48 who believed on the importance of shorter purchase lead time. The importance of continuous improvement of the quality of vendors in service delivery was represented by a mean of 2.43 followed by the importance of quality products with a mean of 2.38 and the reduction of cost of products by a mean of .973. This means that sourcing should be approached from a strategic point of view where it is synchronized with the general organizational goals and objectives for optimal output. This is in line with Eltantawy, Giunipero and Handfield (2014) who posit that there is a shift from the ordinary sourcing function to a more strategic and comprehensive function that integrates purchase of goods and services with the long-term organizational goals and objectives.

The study sought additional personal opinion from the respondents on how aspects of strategic sourcing affect service delivery; in their response, sourcing low cost but quality goods frees funds that are in turn used in creating more access to services to the needy, shorter purchase lead time will enhance service delivery in the sense that the people get services on time during disaster times and finally having a strategy in place aligns the sourcing function with the organizational goal which is service delivery. This concurs with Celuch, Bantham, & Kasouf (2004) who hold that strong relations in supply chain enable organizations to respond effectively to 'customer' needs which in turn translates to enhanced efficiency.

#### 4.4.4. Technology

The third objective of the study was to establish the effect of technology on service delivery in humanitarian organizations in Kenya.

##### 4.4.4.1. Extent of Technology on Service Delivery

Below is a representation of the extent to which technology affects service delivery as indicated by the respondents.

	Frequency	Percent
Not at All	3	14.3
Small extent	3	14.3
Moderate	2	9.5
Great extent	6	28.6
Very great extent	7	33.3
Total	21	100.0

Table 13: Extent of Technology on Service Delivery

Table 13 shows that 33.3% agreed to a very great extent that technology did affect service delivery, followed by 28.6% great extent, 9.5% moderate and 14.3% represented small extent and not at all. Sanders and Premus (2011) hold a similar view that a technology enabled supply chain ensures a seamless flow of information and supplies along the chain which in turn translates to efficiency and enhanced service delivery levels.

#### 4.4.4.2. Influence of Aspects of Technology on Service Delivery

The study sought opinions from respondents on the level of agreement on various aspects of technology influence on service delivery. The response is indicated in Table 14 below.

	Mean	Std. Dev.
Most supply chain processes are automated	2.2857	.90238
Technology is used in the dissemination of information across the supply chain	1.7143	.78376
The firm uses technology to enhance organizational flexibility	2.9048	1.04426
The firm uses technology in resource planning and allocation	2.9524	1.24403

Table 14: Influence of Aspects of Technology

From Table 14, respondents strongly agreed on the role of technology in resource allocation and planning (2.95) followed by use of technology in enhancing organizational flexibility (2.90), automation of supply chain processes (2.29) and use of technology in dissemination of information (1.71). The results imply that technology is an integral aspect in the success of humanitarian organizations and thus should be continuously improved for enhanced efficiency and accountability. This is in agreement with Fowler, King, Marsh and Victor (2000) who posit that technology plays a key role in the integration of all aspects of supply chain with organizational goals and objectives to achieve the desired outcome.

The study also sought additional information on the respondents' opinion on how the aspects of technology affected service delivery in selected humanitarian organizations in Kenya. Automation of supply chain created efficiency by reducing response time; at the same time communication was made easier by technology especially during disaster response. Technology was crucial in human resource management where employees can work flexible hours when responding to disasters. This is supported by the views of Varma and Khan (2018) who believe that today's supply chain must embrace technology to survive due to aspects like globalization, time to market and the growing desire for customization.

#### 4.4.5. Transport and Distribution

The fourth objective of the study aimed at establishing the effect of transport and distribution on service delivery in selected humanitarian organizations in Kenya.

##### 4.4.5.1. Extent of Transport and Distribution on Service Delivery

The respondents indicated the extent to which transport and distribution influences service delivery in selected humanitarian organizations in Kenya. The results are shown in Table 15 below.

	Frequency	Percent
Not at All	2	9.5
Small extent	1	4.8
Moderate	2	9.5
Great extent	6	28.6
Very great extent	10	47.6
Total	21	100.0

Table 15: Extent of Transport and Distribution on Service Delivery

Table 15 shows that 47.6% of the respondents agreed to very great extents that transport and distribution did affect service delivery in humanitarian organizations. This was followed by 28.6% great extent, 9.5% moderate extent, 4.8% small extent and 9.5% not at all. This is supported by Yue, Tseng and Taylor (2014) who hold that transport is the most important function within supply chain; a good transport system creates a competitive edge by enhancing efficiency through reduction of operational costs and promoting service quality.



#### 4.4.5.2. Influence of Aspects of Transport and Distribution

The study sought respondent's opinion on the level of agreement with various aspects of transport and distribution influence on service delivery in selected humanitarian organizations in Kenya.

	Mean	Std. Dev.
The firm continuously maintains manageable transport costs in creating access to service delivery	2.1429	1.15264
The firm balances various transport modes to minimize time in transit	2.0952	.99523
The firm relies on the transport function to create access and connectivity within the supply chain	2.1429	.91026
The firm employs transport management practices to create efficiency and better access	2.1905	.87287

Table 16 Influence of Aspects of Transport and Distribution

From Table 16, respondents strongly agreed that the use of transport management practices did influence service delivery with a mean of 2.19. This was followed by the firm relies on transport crate access and connectivity at a mean of 2.14, that the firm balances various transport modes to minimize time in transit (2.09) and that the firm continuously maintains manageable transport costs in service delivery with a mean of 2.14. This means that transport plays a key role in the creation of access to services as well as maintaining physical links along the supply chain; the function must thus be given special focus. This is supported by Anderson and Wincoop (2004) who opined that costs associated with transport can hinder or promote international movement of goods and services which in turn determines the level of service delivery; adoption of progressive transport management practices is thus imperative.

The respondents were asked to give their opinion on how aspects of transport and distribution influence service delivery, the response was as follows: manageable transport costs free up cash which can be used to create more access to services, shorter time in transit ensures that services reach the intended recipients in time. It is the transport function that ensures services reach the intended beneficiaries within reasonable time; this is achieved through adoption of best transport management practices. This is in line with Yue, Tseng and Taylor (2014) view that transport is the most important function in supply chain and accounts for one third to two thirds of the total organizational logistics costs; the transport function should thus be given special focus.

#### 4.5. Multiple Regression

A multiple regression analysis was conducted to investigate the joint causal relationship between the independent and the dependent variable as represented by the model  $S = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \varepsilon$

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.586	0.343	0.309	1.09904

Table 17: Model Summary

a. Predictors: (Constant), Inventory Management, Strategic Sourcing, Technology, Transport and Distribution

The coefficient of determination R square and correlation coefficient (r) shows the degree of association between the independent and dependent variable. As shown in Table 17,  $R^2 = 0.343$  and  $R = 0.586$ , this shows a strong relation between the variables. From the model summary, adjusted  $R^2$  was 0.309; this indicates that supply chain optimization explains 30.9% of variation in service delivery of selected humanitarian organizations in Kenya.

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	12.001	1	12.002	9.937	0.005
Residual	22.950	19	1.208		
Total	34.952	20			

Table 18: ANOVA Results

a. Dependent Variable: Service Delivery

b. Predictors: (Constant), Inventory Management, Strategic Sourcing, Technology, Transport and Distribution

From table 4.17, an F statistic of 9.937 indicated overall significance of the model as it is greater than the critical F value of 3.88 with  $P \leq 0.05$  (level of significance). This implies that supply optimization concepts were statistically significant in explaining service delivery in selected humanitarian organizations in Kenya.

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	0.675	0.662		1.020	0.021
Inventory management	0.753	0.241	0.497	3.124	0.006
Strategic sourcing	0.645	0.216	0.475	2.985	0.008
Technology	0.796	0.245	0.437	2.559	0.028
Transport and distribution	0.888	0.282	0.586	3.152	0.005

Table 19: Regression Coefficient

a. Dependent Variable: Service Delivery

From Table 4.18, the Analysis Model Is as Follows;

$$S = 0.675 + 0.753X_1 + 0.645X_2 + 0.796X_3 + 0.888X_4 + E$$

$$\text{Service Delivery} = 0.675 + 0.753\text{Inventory Management} + 0.645\text{Strategic Sourcing} + 0.796\text{Technology} + 0.888\text{Transport and Distribution}$$

If all factors were held at zero, service delivery in selected humanitarian organizations was 0.675. The findings as indicated in Table 4.18 show that the relationship between inventory management and service delivery is positive as indicated by a significance level of 0.006 which is below the 0.05 mark. In addition, when all other independent variables are held at zero, a unit increase in inventory management would lead to a 0.753 increase in service delivery in the selected humanitarian organizations in Kenya. This is in line with Lambert (2008) who holds that inventory management is critical in improving supply chain performance through effective cost management which in turn translates to enhanced service delivery levels.

On strategic sourcing, the results indicate a positive and significant relationship with service delivery as indicated by a significance level of 0.008. As shown in Table 4.18, a unit increase in strategic sourcing levels will lead to a 0.645 increase in the level of service delivery in the selected humanitarian organizations. This concurs with Lawson, Cousins, Robert, Handfield and Petersen (2009) who opined that sourcing aspects like supplier integration and supply base responsiveness translate to a better performing supply chain which in turn guarantees enhanced service delivery levels. The relationship between technology and service delivery also came out positive with a significance level of  $P = 0.028 < 0.005$ . One unit of technology will increase service delivery levels by 0.796 as shown in Table 4.18. This is supported by Sanders and Premus (2011) who opined that technology is being used as a means to business competitiveness and performance; it plays a critical part in the success of supply chain through enhanced efficiency and effectiveness of logistics systems which in turn translates to enhanced service delivery levels.

The results further showed a positive relationship between transport and distribution and service delivery as indicated by  $P \text{ value} = 0.005 < 0.05$ . The results indicate that a unit increase in transport and distribution will translate to a 0.888 increase in service delivery in the selected humanitarian organizations. This is supported by the works of Yue, Tseng and Taylor (2014) that it is only with a well-developed transport system that supply chain could reduce operation costs and enhance service quality.

From the results in Table 4.18, transport and distribution had the most influence on service delivery followed by technology, inventory management and strategic sourcing respectively.

## 5. Summary, Conclusions and Recommendations

### 5.1. Introduction

This chapter summarizes the empirical findings arrived at from the study, draws conclusions, recommendations and suggests areas for further research. The general objective of the study was to establish the effect of supply chain optimization on service delivery in selected humanitarian organizations in Kenya.

### 5.2. Summary of Study

The aim of the study was to establish the effect of supply chain optimization on service delivery in selected humanitarian organizations in Kenya. This entailed interrogating the influence of inventory management, strategic sourcing, technology and transport and distribution on service delivery in selected humanitarian organizations in Kenya.

#### 5.2.1. Inventory Management

In determining the relationship between inventory management and service delivery in selected humanitarian organizations, the study sought to establish the extent to which inventory management influenced service delivery. From the findings, the study established that inventory management influenced service delivery to a great extent. This was indicated by aspects of inventory management and their influence on service delivery where it was indicated that the organizations consumed inventory held continuously throughout the year and also maximized benefit from consumed inventory to justify holding stock. It also emerged that the institutions managed days in inventory to minimize funds tied in stock and also made efforts to minimize carrying costs. The regression analysis indicated a positive and significant relationship between inventory management and service delivery in selected humanitarian organizations in Kenya.

### 5.2.2. Strategic Sourcing

The study assessed the influence of strategic sourcing on service delivery in selected humanitarian organizations in Kenya. The influence was seen and solidified by the aspects of strategic sourcing which showed that institutions made deliberate efforts to minimize costs relating to product acquisition, continuously shortened purchase lead time as well continuously improved on vendor quality. It also emerged that institutions were conscious of the quality of products used in service delivery and had a strategy in place to manage sourcing. The findings showed a positive and statistically significant relationship.

### 5.2.3. Technology

The study examined the relationship between technology and service delivery in selected humanitarian organizations in Kenya. The results indicated that technology influenced service delivery as revealed through aspects of technology that showed that most supply chain processes were automated and technology was used in dissemination of information across the supply chain. Technology was seen to enhance organizational flexibility and aided in resource planning. Regression analysis showed a positive and significant relationship between technology and service delivery in selected humanitarian organizations.

### 5.2.4. Transport and Distribution

The study further interrogated the relationship between transport and distribution and service delivery in selected humanitarian organizations in Kenya. The findings revealed that transport and distribution influenced service delivery to a great extent as indicated by aspects of transport and distribution. It emerged that organizations relied on transport to create access to service delivery and maintained manageable transport costs in doing the same. In addition, the organizations employed transport management practices and balanced various transport modes in bid to minimize time in transit. The relationship between transport and distribution and service delivery in selected humanitarian organizations was found to be positive and statistically significant.

### 5.3. Conclusion

From the findings, the study concluded that inventory management influences service delivery in selected humanitarian organizations. Days in inventory emerged as the most influential aspect of inventory management. Days in inventory is an efficiency ratio that measures the average number of days an organization holds its inventory before liquidating and indicates the period funds are tied in stock. Days in inventory measures value, liquidity and cash flow; the shorter the days in inventory the more efficient the organization's inventory management function is. The study concludes that humanitarian organizations observe the economic order quantity when re-stocking in order to achieve the ideal number of days in inventory.

The study also concluded that strategic sourcing influences service delivery in selected humanitarian organizations in Kenya. Existence of a strategy was the most influential aspect of strategic sourcing; by formulating a strategy to guide the sourcing function, organizations align all organizational goals and objectives with the sourcing function. This brings on-board long-term supply partners who the organization can pre-qualify and mentor to offer the desired levels of services at the lowest price possible. The study concludes that humanitarian organizations formulate a strategy to guide their sourcing function.

From the study, it also emerged that technology influences service delivery in selected humanitarian organizations in Kenya. Use of technology in resource planning stood out as the most influential aspect of technology. Through ERP systems humanitarian organizations are able to automate core processes, effectively plan their resources and enhance flexibility within the organization; these enhance operational efficiency and accountability.

The study concluded that transport and distribution had the most influence on service delivery in selected humanitarian organizations in Kenya. Transport management practices use was the most influential aspect of transport and distribution; by adopting modern transport management practices humanitarian organizations are able to reduce costs associated with transport, reduce time in transit and at the same time enhance access to services.

### 5.4. Recommendations

From the conclusion, the study recommends that humanitarian organizations integrate supply chain functions using technology to accurately capture organizational needs and requirement; this should be matched with enhanced resource capabilities to adequately respond to modern-day inventory management challenges. It is also recommended that humanitarian organizations automate inventory management processes to better manage risk and costs associated with the same.

The study also recommends that humanitarian organizations put in place a strategy to guide the sourcing function as well as establishing standard operating procedures to ensure that the sourcing process is competitive and devoid of manipulation. Aid organizations should also ensure that concerned staff is continuously equipped with modern trends to ensure the sourcing function remains strategic.

The study further recommends that humanitarian organizations invest in customized technology that will best facilitate their mode of operation. The technology should link all the aspects of supply chain to offer the required synergy and make it possible to measure the same for decision making. The technology should also aid in the management of staff responding to disasters through time management and communication.

Humanitarian organizations should consider going green in bid to address high costs associated with the transport function. By embracing greener and more sustainable transport options, humanitarian organizations will reduce

their transport and distribution costs and at the same time manage environmental impact through reduction of greenhouse gas emissions. It is also recommended that humanitarian organizations invest in a transport management system to better manage their fleet.

### 5.5. Suggestions for Further Research

The study recommends that further research be done on the same topic focusing on other sectors like medical and hospitality for comparability of findings. The same topic could also be interrogated in other parts of the world to establish other parameters in disaster response and service delivery. There is also need to exploit other aspects that may have influence on service delivery in humanitarian organizations in Kenya like human resource capability.

## 6. Abbreviations and Acronyms

ANOVA	Analysis of Variance
ASAL	Arid and Semi-Arid Land
AU	African Union
CSCMP	Council of Supply Chain Management Professionals
EOQ	Economic Order Quantity
EPOS	Electronic Point of Sale
GFDRR	Global Facility for Disaster Reduction and Recovery
GHO	Global Humanitarian Overview
HCI	Human Capital Index
JIT	Just-in-Time
KRCS	Kenya Red Cross Society
NACOSTI	National Commission for Science, Technology and Innovation
OCHA	Office for the Coordination of Humanitarian Affairs
PDNA	Post Disaster Needs Assessment
SCM	Supply Chain Management
SC	Supply Chain
UN	United Nations
UNDP	United Nations Development Programme
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
VMI	Vendor Managed Inventory
WDR	World Development Report

## 7. Dedication

This research project is dedicated to my parents Nelson and Edith Miriti for their support throughout my academic journey.

## 8. Acknowledgement

Glory is to God for the strength and grace throughout my academic journey. Special thanks to my supervisor Dr. WambuiChege for the guidance, wisdom and patience that made it possible for me to complete this research project. I recognize my MBA classmates for the encouragement and team work that made the journey easier.

## 9. References

- i. Adedi, A. & Zhu, W. (2017). An optimization model for purchase, production and distribution in fish supply chain 2017- A case study. *International journal of production research*, Vol. 55. No. 12, 3451-3464
- ii. Abbott, M. L. & McKinney, J. (2012). *Understanding and Applying Research Design*. USA. John Wiley & Sons, Inc
- iii. Arthur, F & Veinott, J. R (2005). Supply chain optimization, California, USA, *Stanford University*
- iv. Abidi, H., Leew, S. & Klump, M. (2014). Humanitarian supply chain performance management: a systematic literature review. *Supply Chain Management*, Vol. 19 No. 5/6, pp592-608, Emerald publishing limited
- v. Anderson, J. E. & Wincoop, E. V. (2004). Trade Costs. USA. *Journal of Economic Literature*, Vol. 42. No. 3
- vi. Auramo, J., Inkilainen, A., Kauremaa, J., Kemppainen, K., Karkkainen, M., Laukkanen, S., Sarpola, S. & Tanskanen, K. (2014). The roles Information Technology in Supply Chain Management. Helsinki, Finland. *Helsinki School of Economics*
- vii. Beamon, B. M. & Balcik, B (2015). Performance Measure in Humanitarian Relief Chains. USA. *International Journal of Public Sector Management*
- viii. Brynjolfsson, E., Hitt, L. & Yang, S. (2014). Intangible Assets: How the Interaction of computers and organization structure affects stock market valuations. USA. *Bookings Papers on Economic Activity*
- ix. Bhandari, R. (2018) Impact of Technology on Logistics and Supply Chain Management, Mumbai, *IOSR Journal of Business and Management ISSN: 2278-487X*
- x. Baker, P. & Halim, Z. (2007). An Exploration of Warehouse Automation Implementations: costs, service and flexibility issues, *Supply chain Management: An international Journal Vol. 12(2)*
- xi. Balcik, B., Beamon, M., Krejci, C. Kyle, M. & Magaly, R. (2010). Coordination in humanitarian relief chains: Practices, challenges and opportunities. Evanston, Illinois. *Int. J. Production Economics*

- xii. Bantham, J. H., Celuch, K. G. & Kasouf, C. J. (2003). A perspective of Partnerships Based on Interdependence and Dialectical Theory. *Journal of Business Research*
- xiii. Carter, C. R., Rogers, D. S. & Choi, T. Y. (2015). Toward the Theory of the Supply Chain. *Journal of Supply Chain Management, Vol. 51 No. 2*
- xiv. Chingono, T. & Mbohwa, C. (2016). Information Technologies for Humanitarian Logistics and Supply Chain Management in Zimbabwe, Auckland Park, South Africa. *International Conference on Industrial Engineering and Operations Management 23-25, 2016*
- xv. Cohen, S. & Roussel, J. (2005). *Strategic Supply Chain Management: The five disciplines of top performance*. New York, McGraw-Hill
- xvi. Cooper, D. R. & Schindler, P. S. (2006). *Business Research Methods 9th Edition*. USA. McGraw-Hill Irwin
- xvii. Celuch, K. G., Bantham, J. H. & Kasouf, C. J. (2004). Buyer-Seller Relationships: The Role of Expectations, Communications, Behavior and Appraisal Processes in Problem Solving. *Journal of Business Research*
- xviii. Douiri, L. Jabri, A. & Barkany, A. (2016). Models for optimization of supply chain network design integrating the cost of quality: A literature review, Fez, Morocco. *American journal of industrial and business management*, Scientific research publishing
- xix. Dzansi, D. Y. & Dzansi, L. W. (2010). Understanding the impact of human resource management practices on municipal service delivery in South Africa: An organizational justice approach, Freestate, Bloemfontein. *African journal of business management, Vol. 4(6)*
- xx. Ebrahim, Y. (2018). Research methodology textbook on assessing and appreciating and appreciating the impact of urban built form on micro-temperature change: Chapter review. Nairobi. *Research Gate Publications*
- xxi. Eltantawy, R. A., Giunipero, L. C & Handfield, R. B. (2014). Strategic Sourcing Management's Mindset: Strategic Sourcing Orientation and its Implication. *International Journal of Physical Distribution & Logistics Management*
- xxii. Engel, R. J. (2004). Strategic Sourcing: A step-by-step Practical Model. USA. *89th Annual International Supply Chain Management Conference*
- xxiii. Fraser, K., Watanabe, C. & Hvolby, H. (2013). Commitment to service quality in automotive dealerships: results from an Australian pilot study. *Journal of services research Vol. 13*
- xxiv. Faharani, R. Z., Asgari, N. & Davarzani, H. (2009). *Supply Chain and Logistics in National, International and Governmental Environment*. Heidelberg, Germany. Springer-Verlag Berlin Heidelberg
- xxv. Field, A. (2013). *Discovering statistics using IBM SPSS Statistics 4th Edition*. London. Sage publications ltd
- xxvi. Fowler, S. W., King, A. W. & Victor, B. I. (2000). Beyond Products: New Strategic Imperatives for developing competencies in dynamic environments. USA. *Journal of Engineering and Technology Management*
- xxvii. Galetzka, M., Pruyn, A., Verhoeven, J. W. M. (2006). Service Validity and Service Reliability of Search, Experience and Credence Service: A vignette study. *International Journal of Service Industry Management, Vol. 17 No. 3*
- xxviii. Gonzalez, J. L & Gonzalez, D. (2010). Analysis of an Economic Order Quality and Reorder Point Inventory Control Model for Company XYZ. *Journal of Industrial and Manufacturing Engineering*
- xxix. Ghotbabadi, A. R, Feiz, S. & Baharun, R. (2015). Service quality measurement: A review. Malaysia, *International journal of academic research in business and social sciences Vol. 5, No. 2 ISSN: 2222-6990*
- xxx. Griffis, E. S. & Goldsby, J. T. (2015). Transportation Management Systems: An Exploration of Progress and Future Prospects. *Journal of Transportation Management*
- xxxi. Hassini, E. (2008). Building competitive enterprises through supply chain management. *Journal of Enterprise Information Management*
- xxxii. Huang, M. & Cao, L. (2016). The Relationship between Institutional capital and Competitive Advantage: Literature Review and Future Research. Guangzhou, China. *Open Journal of Business and Management*
- xxxiii. Hoffmann, P. & Reiner, G. (2006). Drivers for Improving Supply Chain Performance. *International Journal Integrated supply management, Vol. 2, No. 3*
- xxxiv. Helou, M. M. & Caddy N. I. (2006). Definition Problems and a General Systems Theory Perspective in Supply Chain Management. *Problems and Perspectives in Management Vol. 4, Issue 4*
- xxxv. Huawei Report (2018). 'Tap into new growth with intelligent connectivity'. *Global Connectivity Index- Huawei*
- xxxvi. Ivanov, D., Tsipoulanidis, A. & Schonberger, J. (2018). *Global Supply Chain and Operations Management 2nd Edition*. Switzerland. Springer
- xxxvii. Jumpponen, J., Maria, M. S., Katrina, L. & Virolainen, V. (2014). The Levels of Strategic Purchasing and supply management in Finland and Russia. *Lahti University of Technology LUT*
- xxxviii. Jadhav, V. V. (2015). Role of Information Technology in Supply Chain Management, Maharashtra, India. *International Journal of Management Research and Review, Vol. 5 ISSN: 2249-7196*
- xxxix. Ji, G. & Zhu, C. (2016). A study on Emergency Supply Chain and Risk Based on Urgent Relief Service in Disasters. China. *Procedia Systems Engineering*
- xl. Kothari, C. R. (2004). *Research Methodology 2nd Edition*. India. New Age International Publishers
- xli. Kotabe, M. & Murray, J. (2004). Global Sourcing Strategy and Sustainable Competitive Advantage. *Industrial Marketing Management*
- xlii. Kaluki, B. (2015). Supply chain management practices and service delivery in humanitarian organization in Kenya, 2015. Nairobi. *Published student project, University of Nairobi*
- xliii. Kamau, C. W. (2013). Humanitarian supply chain management in Kenya. Nairobi. *Published student project, University of Nairobi*

- xliv. Kiraga, B. (2014). Transport Management Practices and Logistics Performance of Humanitarian Organizations in Kenya. Nairobi. *Published student project, University of Nairobi*
- xlv. Lawson, B. Cousins, Robert, B. Handfield, J. & Petersen (2009). Strategic Purchasing, Supply Management Practices and Buyer Performance Improvement: an empirical study of UK manufacturing Organization. *International Journal of Production Research Vol. 47, No. 10 2649-2667*
- xlvi. Lui, W., Sidhu, A., Beacom, A. M. & Valente, T. (2017). Social Network Theory. California, USA. *The international Encyclopedia of Media Effects*
- xlvii. Laurin, F. & Fantazy, K. (2017). Sustainable Supply Chain Management: a case study at IKEA. Winnipeg, Canada, *Transnational Corporation Review, ISSN: 1918-6444*
- xlviii. Lambert, D. M. (2008). *Supply Chain Management Process, Partnerships 3rd Edition*. USA. Supply Chain Management Institute
- xlix. Longenecker, C. O. & Scazzero, J. (2000). Improving Service Quality: A Tale of Two Operations. USA. *Journal of Service Theory and Practice*
- l. Lincoln, J. (2015). Network Theory and Analysis. California, USA. *Wiley Encyclopedia of Management*
  - li. Marshall, C. & Rossman, G. B. (2015). *Designing Qualitative Research, 6th Edition*. USA. Sage Publications, Inc
  - lii. McLaren, T. S. & Vuong, D. C. H. (2008). A 'genomic' classification scheme for supply chain management information system. Canada. *Journal of Enterprise Information Management*
  - liii. Melanie, E. & Eriikka, P. (2013). *Handbook of Longitudinal Research Methods in Organization and Business Studies*. United Kingdom. Edward Elgar Publishing, Inc
  - liv. Mewman, M. A., Yano, A. C. & Kaminsky, M. P (2005). Third party logistics planning with routing and inventory costs. Florida. *Kluwer academic publishers*
  - lv. Moller, P. & Paulsson, A. (2008). Supply chain optimization-for sourced products. Lund, Sweden. *Lund University NR 151*
  - lvi. Morales, M. D. R (2000). Optimization problem in supply chain management. Spain. *Erasmus University Rotterdam*
  - lvii. Michael, Q. (2006). *Purchasing and Supply Chain Management: Strategies and Realities*. Glemorgan, UK. IRM Press
  - lviii. Mentzer, J. T., Dewitt, W. Keebler, J. S. & Min, S. (2001). Defining Supply Chain Management. *Journal of Business Logistics*
  - lix. Miller, L. M. (2012). *Continuous Improvement*. Annapolis, Maryland, USA. Miller Management Press, LLC
  - lx. MirHassani, S. A & Nikbkht, A (2010). Transport and Distribution Management in Downstream Oil Industry. Tehran, Iran. *Int. J. Applied Management Science, Vol. 2, No. 4*
  - lxi. Maurice, J. D. (2014). Procurement Practices Influencing Service Delivery: A case of Kenya Power. *Published Student Project, University of Nairobi*.
  - lxii. Nulty, D. D. (2008). The adequacy of response rate to online and paper surveys: what can be done. Queensland, Australia. *Assessment & Evaluation in Higher Education Vol. 33 No. 3 Taylor and Francis Group*
  - lxiii. Nurgurney, A. (2012). Commercial vs. Humanitarian supply chains, 2012. *Humanitarian logistics and healthcare spring, SCH-MGMT 597LG*
  - lxiv. Newman, M. E. J. (2003). The structure and Function of Complex Networks. *Computer Physics Communications*
  - lxv. Nderi, C. M. (2015). Procurement Planning Strategy and Service Delivery: A case of Medicines Sans Frontieres, Kenya Supply Unit. *Published Student Project, University of Nairobi*.
  - lxvi. Nyamu, T. K. (2012). Impact of supply chain management challenges on humanitarian organizations in Kenya. *Published student project, University of Nairobi*
  - lxvii. Ozceylan, E & Paksoy, T. (2013). Reverse supply chain optimization with disassembly line balancing. *International Journal of Production Research, Vol. 51. No. 20, 5985-6001*
  - lxviii. Oballah, D., Waiganjo, E., Wachiuri, E. W (2015). Effect of Inventory Management Practices on Organizational Performance in Public Health Institutions in Kenya: A Case study of Kenyatta National Hospital. Nairobi, *International Journal of Education and Research, Vol. 3 No. 3*
  - lxix. Ojasalo, K. & Gronroos, C. (2017). Service Productivity: Towards a Conceptualization of the Transformation of inputs. Finland. *Swedish School of Economics and Business Administration*
  - lxx. Osei, M. E. (2015). The effect of inventory management practices on service delivery at St. Martins Hospital, Agroyesum, Amansie-West. *Published student Thesis, Kwame Nkuruma University of Science and Technology*
  - lxxi. Ojwang, J. S. (2016). Information technology usage on humanitarian logistics relief organizations in Kenya. Nairobi. *Published student project, University of Nairobi*
  - lxxii. Onyango, S. M. (2016). Inventory Management Practices and Service Delivery of Health Humanitarian Organizations in Kenya. *Published Student Project, University of Nairobi*.
  - lxxiii. Onobrakpeya, A. S., Nana, O. G. & Odu, P. E. (2018). Improving Service Delivery through Information and Communication Technology in the Nigerian Manufacturing Industry. Asaba, Nigeria. *Journal of Management Sciences and Technology 5(2)*
  - lxxiv. Parwanto, N. B., Morohosi, H. & Oyama, T. (2015). Applying network flow optimization techniques to improve relief goods transport strategies under emergency situations. Tokyo, Japan. *American journal of operations research, 2015, 5, 95-111. Scientific Research Publishing*
  - lxxv. Peteraf, M. A. & Bergen, M. (2003). Scanning Dynamic Competitive Landscapes: A Market-Based and Resource-Based Framework. *Strategic Management Journal*

- lxxvi. Ratliff, H. D (2013). 10 Rules for supply chain & logistics optimization. Atlanta, *Georgia Institute of technology, GA 30332 USA*
- lxxvii. Rafid, S.A, Mohib, A. A. & Hossain, F. (2010). Practice of supply chain management performance drivers and procurement process: Case study on Globe pharmaceuticals limited. *Journal of Economics and Sustainable Development ISSN 2222-1700*
- lxxviii. Reham, E., Larry, G, Robert, H. (2015). Strategic management's mindset: strategic sourcing orientation and its implication. *International journal of physical distribution and logistics management*
- lxxix. Robson, C. & McCartan, K. (2016). *Real world research, 4<sup>th</sup> Edition*. United Kingdom. John Wiley & Sons Ltd
- lxxx. Rungtusanatham, M., Salvador, F., Forza, C. & Choi, T. (2003). Supply-Chain Linkages and Operational Performance: A Resource-Based-View Perspective. USA. *International Journal of Operation & Production Management*
- lxxxi. Rodriguez, R. R. (2016). Social Network Analysis and Supply Chain Management. Valencia, Spain. *International Journal of Production Management and Engineering*
- lxxxii. Soni, G. & Kodali, R. (2010). Internal Benchmarking for Assessment of Supply Chain Performance. India. *Benchmarking: An International journal*
- lxxxiii. Schiffing, S. & Piecyk, M. (2014). Performance measurement in Humanitarian Logistics: a customer-oriented approach. United Kingdom. *Journal of Humanitarian Logistics and Supply Chain Management*
- lxxxiv. Simchi-Levi, D., Chen, X. & Bramel, J. (2014). *The logic of Logistics, 3<sup>rd</sup> Edition*. New York, Springer science
- lxxxv. Seth, N., Deshmukh & Vat, P. (2014). Service quality models: A review. New Delhi, India. *International journal of quality & reliability management*
- lxxxvi. Sopha, M. B. & Asih, A. M. S (2018). Human resource allocation for humanitarian organizations: a systemic perspective. Yogyakarta, Indonesia. *MATEC Web of conferences, 154, 01048*
- lxxxvii. Stock, J. R. & Lambert, D. M. (2001). *Strategic Logistics Management 4<sup>th</sup> Edition*. New York, USA. McGraw-Hill
- lxxxviii. Shahzadi, I., Amin, S. & Chaudhary (2013). Drivers of Supply Chain Performance Enhancing organizational output: an exploratory study for manufacturing sector. Faisalabad, Pakistan. *European Journal of Business and Management, Vol. 5 No. 14 ISSN 2222-1905*
- lxxxix. Sillanpaa, I., Shahzad, K. & Sillanpaa, Z. (2015). Supplier Development and Buyer-Supplier relationship strategies – a literature review. Vaasa, Finland. *Int. J. Procurement Management, Vol. 8, No. 1/2 2015*
- xc. Singh, S. N., Wen, F. & Jain, M. (2017). *Advances in Systems Optimization and Control*. Singapore. Spinger Nature Pte ltd
- xc. Stajniak, M. (2016). Transport Management in Enterprises. Poznan, Poland, *Institute of Logistics and Warehousing, 6, 61-755*
- xcii. Scobbie, L., Wyke, S., Dixon, D. & Brady, M. C. (2015). Theory-Based Approach to Goal Setting. Scotland. *Physikalische Medizin Rehabilitationsmedizin Kurortmedizin*
- xciii. Strawderman, L. & Eksioğlu, B. (2011). The role of intermodal transportation in humanitarian supply chains. *Journal of Emergency Management, Vol. 9, No. 1*
- xciv. Sekeran, U. & Bougie, R. J. (2016). *Research methods for business. New York. Wiley*
- xcv. Sanders, N. R. & Premus, R. (2011). IT Applications in Supply Chain Organizations: A Link between Competitive Priorities and Organizational Benefits. *Journal of Business Logistics, Vol. 23*
- xcvi. Taber, K. (2017). The use of Cronbach's Alpha when developing and Reporting Research Instrument in Science Education. Cambridge, UK. *Research in Science Education*
- xcvii. Tanaka, K. (2010). Transport costs, Distance and Time: Evidence from the Japanese Census of Logistics. Chiba-shi, Japan. *Institute of Developing Economies*
- xcviii. Tseng, Y., Verhoef, E., Jong, G., Kuowenhoven, M. & Hoorn, T. (2009). A pilot study into the perception of unreliability of travel times using in-depth interviews. *Journal of choice modeling*
- xcix. Taherdoost, H. (2016). Validity and Reliability of the Research Instrument; how to test the validity of a questionnaire/ survey in a research. Malaysia. *International journal of academic research in Management*
- c. Thuo, C. W. & Njeru, A. (2014). Effect of Public procurement reforms on service delivery at National Spinal Injury Referral Hospital, Nairobi. *Published Student Project, Jomo Kenyatta University of Science and Technology*.
- ci. USAID Delivery Report (2014). Delivery Project, Task order 4. *U.S Agency for international development*
- cii. Varma, T. N. & Khan, D. A. (2018). Information Technology in Supply Chain Management. Jamshedpur, India. *Journal of Supply Chain Management*
- ciii. Valk, W. V. & Wynstra, F. (2012). Buyer-supplier interaction in business-to-business services: A typology using case research, Eindhoven, the Netherlands. *Journal of purchasing & supply management 18(2012) 137-147*
- civ. Valk, W. & Rozemeijer, F. (2009). Buying Business Services: towards a structured service purchasing process. Eindhoven, the Netherlands. *Journal of Service Marketing 23/1 (2009) 3-10*
- cv. Wassenhove, V. (2006). Humanitarian logistics and supply chain management. A. Cozzolino, *Humanitarian logistics, Springer Briefs in Business, DOI: 10.1007/978-3-642-30186-5\_2*
- cvi. Wanyonyi, N. N. (2017). Inventory Management Practices and Service Delivery of Major Supermarkets in Kenya. *Published student project, University of Nairobi*
- cvi. Yue, W. L., Tseng, Y. & Taylor, M. A. (2014). The Role of Transportation in Logistics Chain. Australia. *Proceedings of the Eastern Asia Society for Transportation Studies, Vol. 5*

**Appendix**

**Introduction Letter**

Dear respondent,  
Re: Data Collection

I, Miriti Mutugi Peter being a post-graduate student of Kenyatta University conducting research on 'SUPPLY CHAIN OPTIMIZATION AND SERVICE DELIVERY IN SELECTED HUMANITARIAN ORGANIZATIONS IN KENYA' hereby request you to take a few minutes of your time and respond to the questionnaire attached herewith.

Information obtained through this process will be treated with utmost confidentiality and can only be used for academic purposes. Please note that you are under no obligation to give your name.

Kind regards.

Sincerely,

MIRITI MUTUGI PETER

**Research Questionnaire**

Kindly respond to the following questions to the best of your ability. Information provided will be confidential and will only be used for academic purposes. You are under no obligation to give your name. (Please tick in the appropriate box)

*Section A: Demographic Information*

1) Gender:

Male

Female

Intersex

2) Highest level of education

Certificate

Diploma

Degree

Masters

PhD

Other (specify) \_\_\_\_\_

3) Age bracket

20-30

30-40

40-50

50-60

*Section B: Supply Chain Optimization*

**Inventory management**

1) To what extent does inventory management affect service delivery in humanitarian organizations in Kenya?

Not at all

Small extent

Moderate extent

Great extent

Very great extent

2) For the following statements or questions, indicate the strength to which you attach the respective statement or question.

Kindly tick the appropriate box guided by the following. (Strongly Agree=SA, Agree=A, Not sure=NS, Disagree=D, Strongly Disagree=SD)

<b>Inventory Management</b>	<b>SA</b>	<b>A</b>	<b>NS</b>	<b>D</b>	<b>SD</b>
The firm makes deliberate efforts to minimize carrying costs					
The firm manages the number of days in inventory to minimize funds tied in stock					
Inventory held is consumed continuously throughout the year					
The firm maximizes benefit from the inventory used to justify holding stock					

Table 20

3) In your own opinion, how do the above aspects affect service delivery in humanitarian organizations in Kenya?

.....  
.....



*Strategic Sourcing*

1) To what extent does strategic sourcing affect service delivery in humanitarian organizations in Kenya?

- Not at all
- Small extent
- Moderate extent
- Great extent
- Very great extent

2) For the following statements or questions, indicate the strength to which you attach the respective statement or question.

Kindly tick the appropriate box guided by the following. (Strongly Agree=SA, Agree=A, Not sure=NS, Disagree=D, Strongly Disagree=SD)

<b>Strategic Sourcing</b>	<b>SA</b>	<b>A</b>	<b>NS</b>	<b>D</b>	<b>SD</b>
The sourcing function makes deliberate efforts to minimize costs relating to product acquisition					
The sourcing function continuously improves on the quality of vendors					
The firm is conscious of the quality of products used in the delivery of services					
The sourcing function continuously shortens purchase lead time					
The firm has a sourcing strategy in place					

Table 21

3) In your own opinion, how do the above aspects of strategic sourcing affect service delivery in humanitarian organizations in Kenya?

.....  
 .....

*Technology*

1) To what extent does technology affect service delivery in humanitarian organizations in Kenya?

- Not at all
- Small extent
- Moderate
- Great extent
- Very great extent

2) For the following statements or questions, indicate the strength to which you attach the respective statement or question.

Kindly tick the appropriate box guided by the following. (Strongly Agree=SA, Agree=A, Not sure=NS, Disagree=D, Strongly Disagree=SD)

<b>Technology</b>	<b>SA</b>	<b>A</b>	<b>NS</b>	<b>D</b>	<b>SD</b>
Most supply chain processes are automated					
Technology is used in the dissemination of information across the supply chain					
The firm utilizes technology to enhance organizational flexibility					
The firm deploys technology in resource planning					

Table 22

3) In your own opinion, how do the above aspects of technology effect service delivery in humanitarian organizations in Kenya?

.....  
 .....

*Transport and Distribution*

1) To what extent does transport and distribution affect service delivery in humanitarian organizations in Kenya?

- Not at all
- Small extent
- Moderate
- Great extent
- Very great extent

2) For the following statements or questions, indicate the strength to which you attach the respective statement or question.

Tick the appropriate box guided by the following. (Strongly Agree=SA, Agree=A, Not sure=NS, Disagree=D, Strongly Disagree=SD)

<b>Transport &amp; Distribution</b>	<b>SA</b>	<b>A</b>	<b>NS</b>	<b>D</b>	<b>SD</b>
The firm continuously maintains manageable transport costs in creating access to service delivery					
The firm balances various transport modes to minimize time in transit					
The firm relies on the transport function to create access and connectivity within the supply chain					
The firm employs transport management practices to create efficiency and better access					

Table 23

3) In your own opinion, how do the above aspects of transport and distribution affect service delivery in humanitarian organizations in Kenya?

.....

.....

*Section C: Supply Chain Optimization and Service Delivery*

1) For the following statements or questions, indicate the strength to which you attach the respective statement or question relating to supply chain optimization and service delivery for the last five years

Tick the appropriate box guided by the following. (Strongly Agree=SA, Agree=A, Not sure=NS, Disagree=D, Strongly Disagree=SD)

<b>Service Delivery</b>	<b>SA</b>	<b>A</b>	<b>NS</b>	<b>D</b>	<b>SD</b>
The number of lives saved has increased					
There is better resource utilization					
There is better organizational flexibility					
Disaster response time has improved					

Table 24

2) In your own opinion, what is your recommendation on what should be done to enhance service delivery in humanitarian organizations in Kenya?

.....

.....

**Work Plan**

<b>Description</b>	<b>2019/2020</b>									
	<b>Jul</b>	<b>Aug</b>	<b>Sep</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	
Proposal development										
Proposal defense										
Proposal corrections										
Graduate school submission										
Graduate school corrections										
Pilot study										
Data collection										
Data cleaning, coding and entry										
Data analysis										
Report writing										
Project presentation										
Project Correction										
Submission of final project										

Table 25

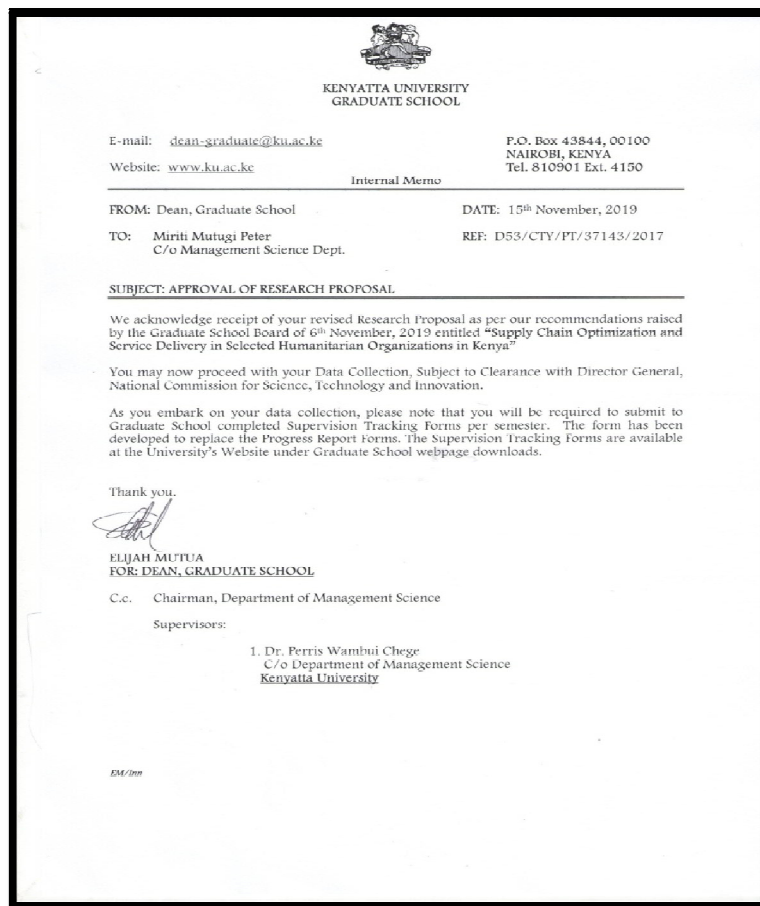


Figure 2

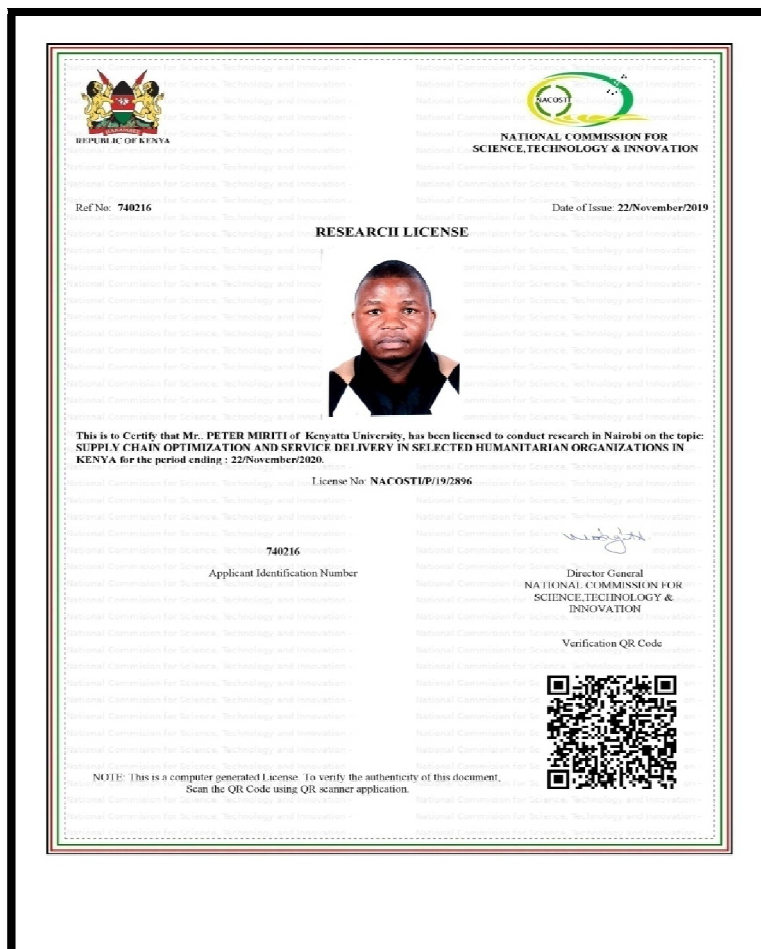


Figure 3

**Humanitarian Organizations in Kenya**

- Action Against Hunger
- CARE
- Caritas International
- Catholic Relief Service
- Doctors Without Borders
- Norwegian Refugee Council
- Emergency Nutrition Network
- Food for the Hungry International
- Hunger plus Inc.
- Interaction
- International Committee of the Red Cross
- International Federation of Red Cross and Red Crescent Societies
- International Organization for Migration
- International Rescue Committee
- Lutheran World Federation
- Mennonite Central Committee
- Mercy Corps
- Overseas Development Institute
- Oxfam
- Refugees international
- Relief International
- Save the Child
- The Office of US Foreign Disaster Assistance
- United Nation's Children Fund
- United Nation's High Commission for Refugees
- United Nation Office for the coordination of Humanitarian Affairs
- US Committee for Refugees
- World vision International

Source: OCHA (2019)