Influence Of Supply Chain Resilience On Performance Of Humanitarian Aid Organizations In Kenya.

Erastus Kiswili Nyile [1], Dr Ismail Noor Shale[2], Dr Anthony Osoro[3]

[123]Jomo Kenyatta University of Agriculture and Technology, Kenya

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Abstract
The purpose of this study was to explore the influence of supply chain resilience on performance of humanitarian aid organizations in Kenya. The study was anchored on the Complex Adaptive Systems Theory and employed survey research design. The study was a census survey of the 330 humanitarian aid organizations with established supply chains, carrying out their operations in Kenya. Objectively developed questionnaires were used to collect primary data. Descriptive statistics and inferential statistics was used aided by SPSS version 24 to facilitate data analysis. Inferential data analysis was done using Pearson Correlation Coefficient and regression analysis. The data was presented using a combination of statistical and graphical techniques. The study concluded that supply chain resilience had a positive significant linear influence on performance of humanitarian aid organizations in Kenya. The study revealed that for humanitarian aid organizations to overcome the vulnerabilities and disruptions affecting their supply chains there is need to embrace utilization of local resources by raising funds from local businesses, individuals and government. Further, the study established that humanitarian organizations use business continuity frameworks to predict shortcomings and develop procedural retaliation and recovery plans to guard important proficiencies against the potentially devastating effects of extended scarcity. To build on supply chain resilience, humanitarian aid organizations should strive to make local capacity building an essential field in emergency response where partnerships bring together knowledge and humanitarian experience in a working relationship that is collaborative, risk sharing and one that involves the affected populations to avert, alleviate and prepare for disasters. The study also recommends the use of outsourcing, spare capacity and use of local suppliers to mitigate against humanitarian supply chain vulnerabilities.

Keywords: Supply Chain Resilience; Humanitarian Supply Chains; Supply Chain Adaptability, Supply Chain Robustness, Supply Chain Flexibility

1.0 Background of the Study

Supply chain management has come out as a common art with which organizations outflank each other competition wise (Jackson, 2018). Effectual supply chain management is a puzzling and complex role, because currently diverse brands are on rise, products' life cycle is reducing, outsourcing strategy is now being adopted by most of the companies, globalization of business are on rise and advancement of information technology is becoming tremendous (Holweg, 2018). Additionally, the composition of the supply chain impacts the utility and price of a commodity all through its existence in the market. Organizations are making all efforts to obtain the highest possible performance from their supply chains by utilizing varied assorted means in the contemporary period (Chan, Ngai & Moon, 2017). Competitive edge can be achieved with no doubt when a company has adopted an effective supply chain strategy and design by utilizing its capabilities on supply chain to realize flexibility, rapid response and efficient cost. In relation to the rising relevance of the supply chain, the competitive focus deviates from rivalry among organizations to contest in supply chain supremacy in the 21st century. Korpela, Hallikas and Dahlberg (2017) emphasized that an effective supply chain design could guarantee a secure spot in competition.

Conversely, natural and manmade catastrophes have substantially increased in magnitude as well as frequency in recent years. According to the United Nations, natural calamities in the coming years will increase in severity, frequency as well as damaging effect (Montz, Tobin & Hagelman, 2017). Humanitarian supply chains are responsible for provision of services in emergencies during disasters by availing food, shelter, medicine, water and sanitation (Montz, Tobin & Hagelman, 2017). When disaster containment is involved, time is an important factor as time saved means lives saved (Apte, Goncalves & Yoho, 2016). Since 80% of disaster and relief operations involve supply chains, proper chain management concepts offer possibilities to increase efficiency and effectiveness of humanitarian operations (Papadopoulos *et al*., 2017).

Humanitarian supply chain professionals all over the world are faced with the challenge of designing proper supply chains that meet the objective of delivering value and aid to vulnerable people at the same time satisfying donors and funders expectations. This is because of the increase in humanitarian disasters worldwide. Olaogbebikan and Oloruntoba (2017) identified resemblances between commercial supply chains and humanitarian supply chains. Worldwide, supply chain experts are in persistent quest for new and inventive methods for building productive and successful supply chains designs that will adjust to quick changes in catastrophic situations (Datta, 2017).

Lodge and Wilson (2016) established that the pressure on humanitarian organizations to handle their roles skillfully during disasters have been braced in the recent times. The ambiguousness humanitarian organizations have to cope with and high expectation of their performance is what necessitated that they quick and reliable response to temporary changes. Companies are trying to reduce inefficiencies in their supply chain to achieve competitive advantages. Lean thinking and agile supply chain are the two common paradigms that the companies are considering in achieving this (Christopher, 2016).

Resilience and flexibility are key features of leagile supply chains. Abdelilah *et al.* (2018) delineates flexibility as the adaptability and versatility where else agility emphasize on the speed that a system needs to adapt making flexibility be a necessary precondition and component for agility. Supply chains play an imperative role in mitigating destruction caused by disasters by delivering items to those in need and ensuring that recovery operations are carried out smoothly (Banikoi *et al.*, 2018). According to Dufour *et al.* (2018), there are several complex humanitarian challenges facing East Saharan Africa arising from famines, civil wars as well as natural disasters. The population is highly prone to humanitarian calamities in comparison with the rest of the world. It also suffers from lack of national resources available to support people in times of humanitarian crisis, commonly known as coping capacity.

Previously, supply chains were designed to achieve service optimization and minimize costs. This is different today as more emphasis is put on supply chain resilience described as the capability of the supply chain to adapt to abrupt occurrences in order to proficiently counter the unfavorable impacts of the occurrence (Dufour *et al.*, 2018). According to Koori and Chirchir (2017), humanitarian organizations are important in Kenya as they have the ability to achieve impacts faster as compared to the government. The development of humanitarian organizations have helped and relieved the government of its pressure of delivering aid to the citizens (Twikirize, 2017). Kuria and Chirchir (2014) noted the numerous humanitarian catastrophes experienced in Kenya including drought, famine, floods, disease outbreaks, food insecurity, conflict and war substantiating the intensity and significance of humanitarian activities in the country. Clarke (2018) on the other side found out the challenges faced by humanitarian supply chains in Kenya as failed comprehension of the important role of supply chains in humanitarian operations, delays in humanitarian tasks, request vulnerability and high expenses. Clarke (2018) further established that half of humanitarian organizations have non-performing supply chains.

Supply chain resilience facilitates reliable supply chains to boost performance of humanitarian organizations. Reliable humanitarian supply chains ensure that inventory is delivered on time and in sufficient amounts, while resilient supply chains are adaptable to different desired states depending on the type and magnitude of the disaster (Mokua & Kimutai, 2019). All this is to meet the primarily objective of the humanitarian aid organizations, which is to save lives, mitigate affliction and maintaining human decency in times of and after crisis while at the same time formulate proficiency in case of similar occurrences (Skliarov, Kaptan & Khorram-Manesh, 2017).

Weiss (2018) described a humanitarian as one who is sternly involved in advocating for the well-being of all humankind without biasness on grounds of gender, ethnicity, sexual orientation, religion or race. The goal of a humanitarian is to salvage lives, alleviate affliction and uphold human decency (Weiss, 2018) achieved by liberation and protection of refugees, housing and feeding the homeless, or promoting recovery from the after effects of natural disasters and civil disorder. Humanitarians combat disease, famine and unrest even if it means taking risks in unfriendly localities and weather and persisting even when the risks of abduction, death threats, loss of lives and other forms of abuse from some unfriendly societies. Humanitarians uphold the wellbeing and opinions of all people, facilitate change in human behavior, and offer assistance in form of money and other necessities to those in need. The necessities can be in terms of food, clothing, housing as well as equipment and medical supplies with the ability to calm the victims in distressful and miserable situations (Collier & Betts, 2017). Humanitarian organizations that have effective SCM system gain from precise, accountable, fair and accurately documented procurement process. Generally, the performance of not-for-profit entities is dependent on their capability of raising funds with a view to fulfilling their goals and objectives (Mangan & Lalwani, 2016).

Kenya has had its fair share of natural disasters, which include; drought, famine, invasions, floods, food insecurity, diseases and manmade disasters like war and conflicts, particularly with the increase of terrorist activities in the country. A comprehensive humanitarian relief establishment has been growing since the Second World War (Puchner, Karamagioli, Pikouli, Tsiamis, Kalogeropoulos, Kakalou & Pikoulis, 2018). Humanitarian organizations in Kenya have been the first line of response when Kenyans are faced by various humanitarian challenges. They play a significant role when the country faces natural and manmade humanitarian crises. This is evident from the work they do in arid areas, during floods, disease outbreaks and conflict and terrorist activities in the country. The environment in which humanitarian aid organizations operates in Kenya is highly unstable, with high probability of effect from political and military influences. The operation is further inefficient due to absence of joint planning and inter-organizational collaboration (Le Pennec & Raufflet, 2018).

1.1 Statement of the Problem

The preparedness and the capability of humanitarian aid organizations to act in the face of disasters and have proper supply chain coordination is moot (Shareef, Dwivedi, Mahmud, Wright, Rahman, Kizgin & Rana, 2019). This concern arises due the increasing number of emergencies putting pressure on humanitarian aid organizations to deliver aid in an appropriate way (Olaogbebikan & Oloruntoba, 2017). The ASALs (vulnerable to hazards) of Kenya make up more than 80% of Kenya's landmass supporting nearly 30% of the total human population (Njoka *et al.*, 2016). About 70% of the disasters in Kenya are hydro-meteorological in nature particularly droughts, floods and disease outbreaks among others. This calls for responsive and robust humanitarian supply chains to deliver aid in a timely manner to vulnerable populations upon colossal donor funding (Njoka *et al*., 2016). Despite the huge chunks of money pumped into humanitarian sector, stringent oversight by donors and expectations from vulnerable populations, humanitarian supply chains still respond in a sluggish, inefficient and poorly coordinated manner to emergencies (Paul, 2019). Mark you, about 80% of disaster and relief operations are related to supply chains (Maghsoudi, Zailani, Ramayah & Pazirandeh, 2018). The poor performance of humanitarian aid organizations is attributed to poor management of supply chain operations (Bealt *et al.*, 2016). Thus, the inference that humanitarian aid organizations are performing way below the expected levels. Sinha (2019) supports this by concluding that 50% of humanitarian aid organizations have non-performing supply chains. Jahre (2017) described humanitarian supply chains as multiple, global, dynamic and temporary. This is because these supply chains face unpredictability and intricacy same as if not greater than that faced by commercial-world supply chains and involve a wide-range set of collaborators from both private and public sectors with little systemization. This makes them lesser active than their commercial cousins do (Kiswili et al., 2021). Investing in better performance of humanitarian supply chains could have profound and lasting impact on society (Wagner & Thakur-Weigold, 2018).

1.2 Objectives of the Study

The objective of this study was to establish the influence of supply chain resilience on performance of humanitarian aid organizations in Kenya.

1.3 Research Hypothesis

H_0: Supply chain resilience does not significantly influence the performance of humanitarian aid organizations in Kenya.

2.0 Literature Review

The underpinning theory in this study include the Complex Adaptive Systems Theory.

2.1 Complex Adaptive System Theory

Complex Adaptive System (CAS) entails an interconnected network of numerous agents who respond adaptively to variations in environment in addition to the system of agents in it. For example, humanitarian entities in Kenya have their operations in a volatile environment, which varies occasionally because of disruptions and they have the necessity to cope and survive in the same environment. Consequently, their operating environment is composed of a fair share of chaos and order, complex non-linear systems struggles to be neither overly stable nor unstable (Wycisk, McKelvey & Hulsmann, 2008).

Holland (1995); Choi, Dooley and Rungtusanatham (2001) perceived CAS as a type of framework that over time forms reasonable structures as far as effectively expressed properties of adaptation and self-reorganization are concerned. In a CAS, adaptation implies that the system's agents or components have responsiveness, flexibility, reactivity and occasionally proactive in handling inputs of other agents, or components influencing them. Thus, humanitarians must be proactive, adaptable, notwithstanding re-planning their structures and settling on key decisions. The agents constituting a CAS are steered by order generating principles, known as schemas (McCarthy 2003; Pathak *et al*., 2007; Hasgall, 2013), determining CAS response in the course of adaptation. The CAS environment is both rugged and dynamic, with CAS agents having to adapt in order to maintain fit with the environment. Over the span of adaptation, new changes in the CAS just as its current circumstances may arise in a process of coevolution, making it important to learn and make applicable variations to schemas for upgrade of wellness.

Conversely, CAS is impacted upon by inconsistent association between the cause and effect of CAS events. In the event of happening of a disruption, it may contribute to disproportionately negative or positive outcomes. According to Urry (2005), inconsistencies in the association between the cause and effect of CAS events can be termed as non-linearity. An example of this is the number of type of connections as well as association among CAS agents having the ability of influencing the degree by which CAS agents functions autonomously in a way that higher connectivity is attributable to lower agent's autonomy and the other way round (Pathak *et al*., 2007). Non-linearity in a CAS further contributes to self-reorganization as well as emergence. Self-organization and emergence in a CAS can lead to changes that encompass developing new structures, patterns as well as properties.

The feature of scalability implying that varied entities at various levels of CAS contain similar concerns, may further foster such variation, for instance, reduction of costs, fostering delivery speed in addition to adaptation (Surana *et al*., 2005). Consequently, individual agents aim at attainment of their goals through addressing their concerns, but lead to similar collective patterns emerging at the extended wider system level.

Supply chain looks like a CAS, as it mirrors the primary features of a CAS. For instance, a system is robust provided it is able to adapt to environmental threats and avoid violating its integrity as a system. In most cases, this entails modification of its environment, thus it essentially encompass coevolution. It is further probable to be highly non-linear, for instance, that seemingly negligible variation in

supply chain controls enables disastrous events to have probability of occurring (Choi, Dooley & Rungtusanatham, 2001; Surana *et al*., 2005; Pathak *et al*., 2007; Hearnshaw & Wilson, 2013).

Supply chain resilience is depicted in the form of process of self-organization, another form of a CAS. Managers in the Kenya Humanitarian entities need to have awareness that supply chain resilience is exhibited utilizing the process of self-reorganization as opposed to outcome of deliberately controlled by one entity. This in part is due to the fact that supply chain is complex to the degree that majority of what occurs therein is beyond the visibility and reach of a principal firm. Consequently, managers need to be prepared to be flexible for purposes of collaborating with more humanitarian entities as well as other stakeholders who include suppliers as well as the state for purposes of enhancing the ability to create resilience in their entities.

In general, supply networks can be perceived from CAS viewpoint differently. The components composing CAS are agents, autonomous actions, interaction as well as learning. Such components can be found in the supply network. The agents consists of firms as well as groups of entities working together in terms of partnerships and alliances sharing rules in addition to economic benefits (Choi *et al*., 2001). Firms can constitute suppliers, manufactures, retailers, clients; having a role in the supply chain system. Such entities brings out an atmosphere of intensive association driven by exchange of material, monetary and intelligence resources as well as knowledge. The exchanges results from pursuing of each company's goals individually (Hakansson & Snehota, 1995; Wycisk, McKelvey & Hülsmann, 2008).

In the present study, the Complex Adaptive System theory aids in explanation of the concept of supply chain resilience. According to the theory, organizations need to be able to adapt to complex environments, for instance humanitarian organizations operates in an environment of disasters. To be able to adapt, humanitarian organizations must become resilient in all aspect including in the supply chain. This theory instigates the second research hypothesis:

H_0: Supply chain resilience does not significantly influence the performance of humanitarian aid organizations in Kenya.

2.2 Conceptual Framework

A conceptual framework denotes a model of presentation in which the researcher conceptualizes or provide a presentation or association among variables in the research and depict this association graphically or figuratively (Merriam & Grenier, 2019). As espoused by Creswell and Poth (2017), a variable is a measurable feature, which assumes varied values in the context of units of a given population. The primary variables in the present study are categorized as either independent or dependent variable. Consequently, this study aimed to establish the influence of supply chain resilience on performance of humanitarian aid organizations in Kenya.

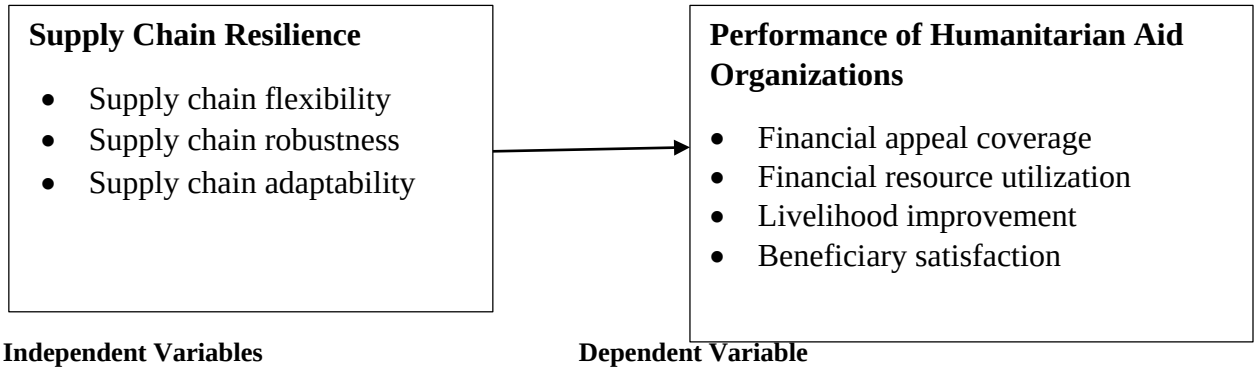

Figure 1: Conceptual Framework

2.3 Supply Chain Resilience

Resilience is a multi-faceted dynamic capability meaning that it functions as the dynamic ability for entities to integrate, build as well as reconfigure both internal and external competencies with ability to sustain performance of enterprises (Eltantawy, 2016). Following a disturbance, resilience enables a given system, whether it is a supply chain, to revert to its original state or to advance to another desirable state (Adobor & McMullen, 2018). Resilience in an organizational sense is viewed as the ability to withstand and flourish in crises and disturbances (Fisher, 2017). Kamalahmadi and Parast (2016) established that supply chain resilience is connected to existing activities such as crisis management and business continuity plans.

The interest of researchers and policy makers concerning resilience is hugely motivated by deteriorating business vulnerabilities and disruptions by both external factors including legislative and environmental vulnerabilities and internal ones including monetary standing as well as internal business-process vulnerabilities (Krishnan & Pertheban, 2017). Point to note therefore is that the key motivation force of resilience is disruption. The disturbances in a supply chain are either internal to the firm (process and control risks), external to the firm but internal to the supply chain network (demand and supply chain risks) and external to the network (environmental risks) (Abdel-Basset, Gunasekaran, Mohamed & Chilamkurti, 2019). Organizations cope with disruptions either reactively or proactively. Supply chains that adjust ex-post to changes are known to be reactive and are usually referred to as agile supply chains (Gichuki, 2017). Alternatively, supply chains can implement ex-ante measures to cope with turbulences hence referred to as robust

supply chains (Cohen & Kouvelis, 2020). Supply chain resilience balances both reactive and proactive strategies such that a resilient supply chain is both adaptable and robust (El Baz & Ruel, 2020). Agility and robustness are therefore dimensions of resilience.

Flexibility as stated is among the primary features of leagile supply chain (Fadaki, Rahman & Chan, 2020) and is consequently depicted on the agility basis by Chan, Ngai and Moon (2017) adding that is not the only needed capability. A way of defining flexibility capabilities as espoused by Srinivasan and Swink (2018) is by product, mix, volume as well as delivery. Product flexibility denotes the ability of modifying existing products as well as introducing others (Manning & Soon, 2016). Conversely, mix denotes the ability of alternating the diversity of produced or delivered products over a given time (Lyons, Um & Sharifi, 2020).Volume can be denoted as the level of varying the compiled output (Lyons, Um & Sharifi, 2020).Finally, when the delivery dates can be moved, delivery flexibility exists (Lyons, Um & Sharifi, 2020).

Despite lean and agile sharing similar aim of creating value and fostering performance, the emphasis is put in a different way. In specific terms, agile concepts emphasis is on improved flexibility level in adapting to dynamic environments as opposed to reduction of costs. According to Chan, Ngai and Moon (2017), flexibility denotes the adaptability as well as versatility while agility is focused on the system's speed needed. Consequently, flexibility appears as mandatory precondition for agility. In addition, the contingency theory is of the view of inexistence of no universal method for managing or organizing firms, thus, management style must be based on the situation constraints being experienced by the entity (Baker, 2017). The firm's flexibility in adapting to the environment dictates its success in a dynamic changing environment.
As per Sreedevi and Saranga (2017), flexibility is the ability of changing or reacting with minimal adverse repercussions for time, effort, cost as well as performance. Sreedevi and Saranga (2017), asserts that environmental unpredictability is among the primary reasons for a firm seeking flexibility. On this basis, it can be inferred that flexibility is closely associated with uncertainty and variability. The association is as illustrated by Lyons, Um and Sharifi (2020) who linked the three facets in the context of management of unplanned change and recommends flexibility as a better approach to counter the effects of unplanned change, while uncertainty and variability are elements of the inadvertent change.

3.0 Methodology

A survey research design was employed for this study. This research design is appropriate where large population geographically spread is involved which was the case in this study. The design enabled the study to apply both qualitative and quantitative research approaches as observed by Rahi (2017) that the two approaches reinforces each other. The target population of this study was 330 humanitarian aid organizations carrying out their operations in Kenya as derived from the NGO Coordination Board of Kenya (2018). This study was a census examining the entire population (Mujere, 2016), supply chain managers in this case, that have a particular set of characteristics such as specific experience, knowledge, skills or exposure to an event. Questionnaires were used to obtain primary data for the study. The questionnaires contained structured and semi-structured questions that captured the various variables of the study. The questionnaires were hand delivered by research assistants to the respondents using drop and pick technique. Concerning the qualitative aspects of the study (open-ended questions), the authenticity of the findings was considered primal thus the researcher hoped that respondents would be truthful by avoiding giving distorted accounts of events surrounding supply chain resilience.

With the study being quantitative and qualitative in nature, both descriptive statistics and inferential statistics was employed. The study adopted inferential data analysis in order to enable it make suppositions that extend beyond the immediate data alone to infer from the sample data about the whole population (Trafimow, 2017). The study used SPSS version 24 to facilitate the analysis of data. Inferential data analysis was done using Pearson correlation coefficient and regression analysis. Data was also analyzed using descriptive statistics; measures of central tendency, measures of dispersion and measures of symmetry and inferential statistics. Linear regression analysis revealed the correlation and strength of the relationship between both independent and dependent variables. Analysis of Variance also sought to test the goodness of fit of the regression models and finally to test the hypothesis of the regression models. Data collected from open-ended questions was analyzed qualitatively through content analysis. The information was presented using a combination of statistical techniques and graphical techniques. The hypothesis was tested by running an Ordinary Least Square regression model for the combined sub-constructs of each independent variable against the combined measures of the dependent variable. The acceptance/rejection criteria was that, if the P-value is greater than 0.05, the study fails to reject the H_0 but if P-value is less than 0.05, the H_0 is rejected.

4.0 Research Findings and Discussions

The target population in this study was 330 supply chain managers in humanitarian aid organizations operating in Kenya as derived from the NGO Coordination Board of Kenya (2018). The researcher distributed 330 questionnaires from which, 290 were filled and returned, an 87.88% response rate as indicated on Table 1. This was a perfect representation and enough to make generalizations of the study findings. This response rate conforms to Ebert, Huibers, Christensen and Christensen (2018) affirmation that a 50% response rate is sufficient for analysis; a rate of 60% is good and that of above 70% is exceptional. The outstanding response rate was attributed to the method of data collection used, whereby the researcher, with assistance from research assistants administered questionnaires to the respondents who filled them after which they were then collected. The rate of response rate demonstrated willingness to respond to the

study. This praiseworthy degree of response was achieved with efforts by the researcher, who made constant visits and followed up to get the questionnaires filled. The unsuccessful response rate was 12.12%.

Table 1: Response Rate

Category	Frequency	Percentage
Response	290	87.88
Non response	40	12.12
Total	**330**	**100.0**

4.1 Descriptive Analysis of Supply Chain Resilience

Descriptive analysis was used to describe the basic features of the data in the study providing a summary about the sample and the measure thus helping in simplifying massive amounts of data in a sensible and convenient style. It expressed the variables in frequencies, percentages, means and standard deviation. The study analyzed descriptive statistics for all the study variables. The respondents were probed on various indicators of supply chain resilience and performance of humanitarian aid organizations in Kenya. This objective was measured using the following indicators: supply chain flexibility, supply chain robustness and supply chain adaptability in the opinion statements given. The responses were rated on a 5-point likert scale where respondents either indicated not at all, small extent, moderate extent, large extent and very large extent. In this study the scale of not at all and small extent indicated disagree whereas large and very large extent meant agreed. The results were expressed as frequencies, percentages, mean and standard deviation as shown in Table 2 below.

***Table 2*: Descriptive Analysis of Supply Chain Resilience**

Statements on Supply Chain Resilience	1 %	2 %	3 %	4 %	5 %	Mean	Std Dev
Leagility enables the supply chain to become resilient after disruptions	0(0)	0(0)	50(17.2)	200(69)	40(13.8)	3.97	.557
Out of adoption of resiliency, supply chain flexibility has been achieved	0(0)	0(0)	41(14.1)	179(61.7)	70(24.1)	4.07	.608
Supply chain alignment has been made possible by resilience	0(0)	0(0)	40(13.8)	170(58.60	80(27.6)	4.14	.629
Resilience reduces supply chain vulnerability and improved adaptability	0(0)	0(0)	32(11.0)	150(51.7)	108(37.2)	4.26	.639
Our supply chain is prone to vulnerabilities and disruptions from both external factors and internal factors ranging from financial to internal business-process susceptibilities.	0(0)	0(0)	10(3.4)	160(55.2)	120(41.4)	4.38	.553
The humanitarian organizations cope with disruptions and vulnerabilities either reactively or proactively	0(0)	0(0)	20(6.9)	191(65.9)	79(27.2)	4.20	.551
Supply chain flexibility enables humanitarian organizations to handle the effects of unforeseen changes, ambiguity and volatile environment in which these organizations operate in	0(0)	0(0)	30(10.3)	170(58.6)	90(31.0)	4.21	.610
Resilience practices give humanitarian aid organizations the aptitude to survive, adjust and keep their operations running in times of turbulent change	0(0)	0(0)	50(17.2)	190(65.5)	50(17.2)	4.00	.588
Through resilience practices our supply chains have apparent ability to recover from	0(0)	0(0)	40(13.8)	189(65.2)	61(21)	4.07	.584

inevitable risk events more effectively than others	

Key: 1-Not at all; 2-Small Extent; 3-Moderate Extent, 4-Large Extent and 5- Very Large Extent

The respondents were asked to indicate the extent to which leagility enables the supply chains to become resilient upon disruptions. Majority of the respondents (82.8%) agreed that leagility contributes to resilience of supply chains as 17.2% moderately agreed. By humanitarian aid organizations adopting resilience design in their supply chains, flexibility has been achieved as indicated by 85.8% and 14.1% of the responses who agreed and moderately agreed respectively. Adoption of supply chain resilience by humanitarian aid organizations has also made possible supply chain alignment. Resilience is indicated by 88.9% of the respondents to improve supply chain adaptability and reduces supply chain vulnerability defined as the susceptibility of the supply chain to the probability and significances of disruptions.

Respondents (96.6%) agreed that humanitarian supply chains are prone to vulnerabilities and disruptions from both external factors and internal factors such as financial and internal business-process vulnerabilities as 3.4% moderately agreed. In response to this, the humanitarian aid organizations cope with disruptions and vulnerabilities either reactively or proactively as 93.1% of the respondents agreed while 6.9% moderately agreed to the statement. A large number of the respondents (89.6%) agreed and 10.3% moderately agreed that supply chain flexibility enables humanitarian organizations to deal with the effects of unplanned changes, uncertainty and volatile environment in which these organizations operate. Furthermore, 82.8% of the respondents indicated that resilience practices give humanitarian aid organizations the capacity to survive, adapt and sustain their operations in the face of turbulent changes while 17.2% moderately alluded to that. By humanitarian aid organizations adopting resliency in their supply chains they have apparent ability to recover from inevitable risk events more effectively than others as indicated in 86.2% and 13.8% of the responses agreeing and moderately agreeing to the statement. In general, resilience is typically focused on bringing supply chain operations back to their previous condition following a crisis, and some humanitarian supply chains have painfully proven to not be resilient.
Nevertheless, many humanitarian supply chains in Kenya have emerged stronger than they were prior to crises and disruptions, learning valuable lessons and rapidly reconfiguring to meet emergent needs, suggesting that the concept of resilience needs to be reimagined.

In general, the findings as in Table 2 indicate that resilience of supply chains enables humanitarian supply chains to achieve the elements of flexibility, alignment and reduction in supply chain vulnerability. Humanitarian supply chains are prone to vulnerabilities and disruptions emanating internally or externally to the organizations. The adoption of resilience design in supply chains give humanitarian aid organizations the capacity to survive, adapt and sustain in the event of turbulences. Resilience design enables humanitarian supply chains to recover from inevitable risky events in an effective way. The findings of this study corroborate with Mutebi, Ntayi, Muhwezi and Munene (2020) study on self-organization, adaptability, organizational networks and inter-organizational coordination, with an empirical evidence from humanitarian organizations in Uganda, that supply chain resilience enhances resource utilization, helps in meeting needs and saving lives and ensuring time targets are met. Further, Nemuel, Mukulu and Waiganjo (2017) established that supply chain re-engineering and risk awareness were significant predictors of supply chain resilience in organizations.

4.2 Qualitative Analysis of Supply Chain Resilience

Examination of supply chain managers views on supply chain resilience were examined using two open-ended questions. The first question sought to identify the challenges faced by humanitarian supply chains in implementing resiliency. Secondly, supply chain managers opinions was sought on how humanitarian supply chains can be designed to be resilient to overcome vulnerabilities and disruptions. From the examination of the views of supply chain managers, insufficient resources emerged as a major challenge in attaining supply chain resilience by humanitarian organizations in Kenya. Humanitarian aid organizations disclosed struggle in accessing enough, appropriate and continuous funding for their humanitarian work. Reaching out to donors is as difficult as handling funding conditions. Humanitarian aid organizations have inadequate resource mobilization skills thus no funds are collected on local capacity as they wait for international donors to approach them. Sewordor, Esnard, Sapat and Schwartz (2019) alluded that humanitarian aid organizations have high reliance on donors and often deviate from their focus to act in compliance with donors. This leaves humanitarian organizations exposed to donors' manipulation making it hard to measure their impact over time.

Demand uncertainty was identified as a challenge too in attainment of resilience in humanitarian aid organizations in Kenya. The uncertainty and unpredictability of events, which is especially common in sudden-onset disasters in regard to their timing, location, nature and magnitude, interfere with the prediction of supply and demand. The probability of disturbance therefore increases greatly, which makes response and preparation equally important. The degree to which demand can be projected or forecasted is crucial for making supply chain decisions. The needs for vulnerable populations vary significantly according to the nature of the disaster and phases in the disaster timeline. The findings confirm Rahman, Majchrzak and Comes (2019) argument that humanitarian supply chain managers are in constant pressure from unpredictable possibilities of when, where, what, how much, where from and how frequent; to be precise, the rudimentary components necessary for an efficient supply chain structure are extremely ambiguous. Feng and Cui (2020) added that disaster demand forecasting is challenging, as there is no historic reference although the data may still be useless if available as it is not guaranteed to predict the future disaster demand due to the unique nature of disasters, in that, there will be statistical variations every time a disaster strikes.

Poor coordination within the humanitarian supply chains was identified as a challenge to resilience design. In complex emergencies, the sturdier the coordination, the better the quality of services delivered. In absence of coordination, humanitarian aid organizations end up duplicating projects in one place or concentrate attention where it is not needed. Comes, Van de Walle and Wassenhove (2020) supported this by emphasizing that in several occurrences, lack of strong central coordinating mechanism make the work of humanitarian aid organizations look haphazard. Host governments prioritizing bilateral and multilaterals while ignoring humanitarian aid organizations especially in making decisions was a challenge to supply chain resilience. This is because reports or concerns from humanitarian aid organizations are regarded as non-technical thus not taken into account. This is despite humanitarian aid organizations (especially local ones) being in a better position to understand the needs of the disturbed populations due to their familiarity and interactions with the affected populations.

Respondents identified indifference in development approaches as a disruption to humanitarian supply chain resilience. Many humanitarian organizations are still focusing on 'hardware' approach to development such as development of infrastructure and delivery of services in place of the 'software' approach of empowering people and local institutions so they have the capacity to handle what comes their way. The rates of poverty and illiteracy remain substantial. Humanitarian organizations are deeply cognizant of the growing and massive needs of vulnerable people and face difficulty in responding to all these needs. There is a lack of sustainability and ownership of development interventions by communities. Bonga (2020) in the study, poverty and pandemic response, concur that the society and communities are spoiled by methods that encourage reliance and the drive to take responsibility individually is diminished. For humanitarian aid organizations to overcome the vulnerabilities and disruptions affecting their supply chains and be resilient, utilization of locally available resources is necessary as money can be raised from businesses, individuals, government and investment. For this to be achieved, humanitarian aid organizations ought to possess capable management and corruption free policies, properly planned approaches and domestic integrity. The findings mirror Love, Allison, Asche, Belton, Cottrell, Froelich and Pinto da Silva (2020) on emerging Covid-19 impacts, responses and lessons for building resilience that relief activities ought to be able to effectively gather resources, contain the disaster and alleviate any possible repercussions. This indicates how important it is to be swift in resource mobilization during emergency action and how quick reaction can limit the overall severity of a disaster in terms of loss of life. Proper coordination of humanitarian activities and ability to forecast demand play an important function in enactment of supply chain resilience by humanitarian aid organizations. In addition, the growing frequency and complex nature of emergencies makes it more important for the humanitarian sector to incorporate local emergency capacity at its heart and build that capacity as part of resilient development plans.

Humanitarian organizations utilize the business continuity frameworks to get ahead of difficulties and come up with systematic retaliation methods to guard the important proficiencies against possible future disturbances involving protracted shortages. Business continuity is an administrative process that spots risks and susceptibilities that could affect the chances of activities and processes to be resilient. The business continuity framework helps build organizational resilience and the aptitude for an operative reaction to disturbance. Organizations have the ability to react swiftly and efficiently to safeguard processes by dedicating time to a practice referred to as business impact analysis thus considerably lowering damages and expenditure. Humanitarians need to evaluate their weaknesses, the implications of such, and come up with strategies to get them through coercion. The key is to prioritize the essential business processes and ensure that they are both efficient and resilient. Another principle that govern business continuity is that plans are living documents that ought to be tested and put into practice. Chaudhri, Cordes and Miller (2019) recommended that whenever there is an occurrence, it is a practical opportunity for humanitarian organizations to put their plans to trial, find out what works and what doesn't, and modify their plans in regard to conclusions made. The organizations can then hold dedicated debrief sessions to establish whether the methods they applied were effective and whether new discoveries have been made.

4.3 Multiple Regression Analysis Results

The research used multiple regression analysis to establish the linear statistical relationship between independent and dependent variables of this study. The hypothesis as stated in this study was tested using regression models.

4.3.1 Test of Hypothesis: Supply Chain Resilience and Performance of HAOs

A correlation analysis for the construct supply chain resilience was conducted to determine how supply chain resilience correlated with performance of HAOs. Table 3 indicates that the Pearson correlation coefficient was 0.708. These findings indicate that there is a strong positive linear relationship between supply chain resilience and performance of HAOs.

Table 3: Correlation Analysis for Construct Supply Chain Resilience

Variable		Performance of HAOs	Supply Chain Resilience
Performance of HAOs	Pearson Correlation	1	.708**
	Sig. (2-tailed)		.000
	N	290	290
Supply Chain Resilience	Pearson Correlation	.708**	1
	Sig. (2-tailed)	.000	

N	290	290

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

The researcher conducted regression analysis to establish the influence of supply chain resilience on the performance of HAOs. The hypothesis to test for this specific objective was:

H_0: Supply chain resilience does not significantly influence the performance of humanitarian aid organizations in Kenya.

The histogram in figure 2 indicates that the data was normally distributed. The residual explains the error in the fit of the model to the i^{th} observation yi and are essential in determining the adequacy of the fitted model. According to Wogi, Wakweya and Tesfay (2018), analysis of the residual is frequently helpful in checking the assumption that errors are normally distributed with constant variance, and in determining whether additional terms in the model would be useful.

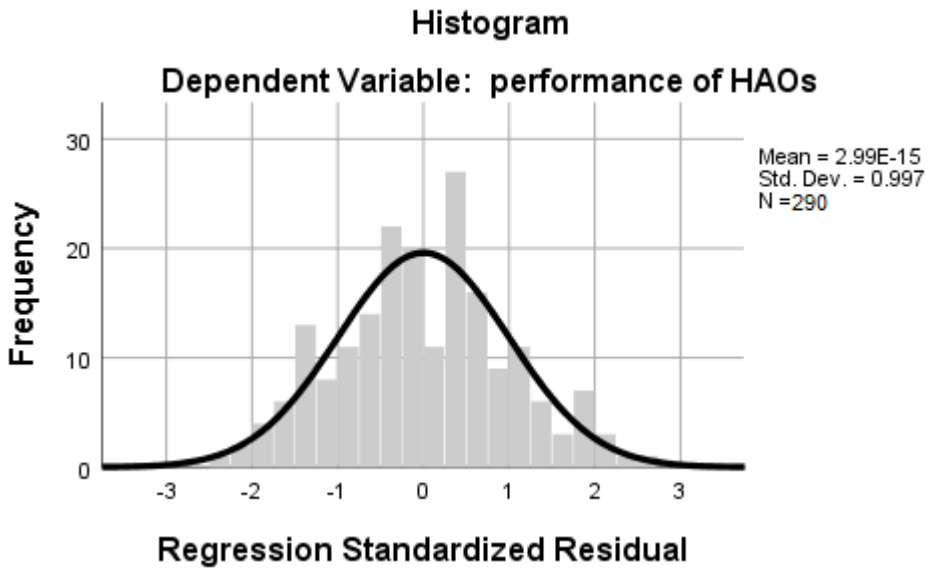

Figure 2: Histogram Supply Chain Resilience on performance of HAOs

The summary of the linear regression model used for this specific objective indicates a coefficient of determination, R^2=0.501 which means that about 50.1 percent of the change in the performance of HAOs in Kenya can be explained by supply chain resilience. The result is presented in Table 4.

Table 4: Model Summary of Supply Chain Resilience

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.708[a]	.501	.492	.67172

a. Predictors: (Constant), Supply chain resilience

b. Dependent Variable: Performance of Humanitarian Aid Organizations

Table 5 shows the ANOVA result of the regression of performance of HAOs on supply chain resilience. The result indicates that the significance of the F-statistic ($p<0.05$) is less than 0.05, an implication that supply chain resilience has a significant influence on performance of HAOs.

Table 5: ANOVA of Supply Chain Resilience

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	10.026	1	10.026	17.036	.000[b]
	Residual	169.494	288	.589		
	Total	179.520	289			

a. Dependent Variable: Performance of Humanitarian Aid Organizations

b. Predictors: (Constant), Supply chain resilience

Shown in Table 6 are the coefficients and t-statistic of the obtained from the model. The constant term $\beta_0 = 4.527$ is interpreted to mean that if supply chain resilience is held constant, then there will be a positive performance of HAOs in Kenya by 4.53. The regression coefficient for supply chain resilience was positive and significant ($\beta_1 = 0.525$, p<0.05), with a t-value of 4.127. This implies that a unit increase in supply chain resilience is predicted to increase the performance of HAOs by 0.525 units.

Table 6: Coefficients of Supply Chain Resilience

		Unstandardized Coefficients		Standardized Coefficients		
Model		**B**	**Std. Error**	**Beta**	**T**	**Sig.**
1	(Constant)	4.527	.532		8.507	.000
	Supply chain resilience	.525	.127	.708	4.127	.000

a. Dependent Variable: Performance of Humanitarian Aid Organizations

Performance of Humanitarian Aid Organizations = 4.527 + 0.525 Supply Chain Resilience

From the result in Table 3 to 6 above, the decision is to reject the null hypothesis that supply chain resilience does not significantly influence the performance of humanitarian aid organizations in Kenya, and conclude that that supply chain resilience has a significant influence on the performance of HAOs. As a matter of the fact, the disaster happening cannot be avoided, but its consequences can be mitigated through a holistic resilient management of the relief supply chain operation. The findings of this study concur with Naburuk (2018) that it is only a supply chain resilient management strategy that improved the performance and effectiveness of humanitarian logistics and relief supply chains operation, while a lack of it imposed huge dramatic consequences for stricken populations. Further, Grange, Heaslip, McMullan (2019) in their study figured out the platform to encourage a professionalization of the supply chain resiliency disciplines in relief operations and strengthening the corresponding functions during the humanitarian aid processes after disaster happening.

5.0 Conclusion

Regarding to supply chain resilience, it could be concluded that supply chain resilience had a positive significant linear influence on performance of humanitarian aid organizations in Kenya. Humanitarian supply chains are prone to vulnerabilities and disruptions emanating internally or externally to the organizations. The adoption of resilience in supply chains give humanitarian aid organizations the capacity to survive, adapt and sustain in the event of turbulences to save lives of vulnerable populations. Resilience enables humanitarian supply chains to recover from inevitable risky events in an effective and efficient way that minimizes wastage of scarce resources.

The findings from the study revealed the various challenges faced in attainment of supply chain resilience by humanitarian aid organizations as insufficient resources, demand uncertainty, poor coordination within the humanitarian actors, indifference in development approaches and community poverty and illiteracy. For humanitarian supply chains to overcome these vulnerabilities, local resource mobilization makes it possible to raise funds from local businesses, individuals, government and locally generated income. For this to be realized, humanitarian aid organizations need to have a capable administration, systems that shun fraud, apparent plans and internal credibility arising from proper design of their supply chains.

Proper coordination of humanitarian activities and ability to forecast demand play an important responsibility in the employment of supply chain resilience by humanitarian aid organizations. In addition, the increase in numbers and complexity of disasters intensifies the need for the humanitarian department to include the local emergency capacity in its pre disaster plan and reinforce the capacity as a part of resilient development plans. The findings of this study indicate local capacity as one of the main fields in need of improvement and on which to build on in the country. To build on resilience of supply chains, humanitarian aid organizations should strive to make local capacity building an essential field in emergency response where partnerships bring together knowledge and humanitarian experience in a working relationship that is collaborative, risk sharing and one that involves the affected populations to avert, alleviate and prepare for disasters.

Humanitarian organizations utilize the business continuity frameworks to predict threats and come up with organized containment strategies to safeguard major proficiencies from the destructive effects of protracted shortages. Business continuity is an administrative method that detects hazards and shortcomings that might affect the consistency of organizational setups and procedures The business continuity framework enables the organization develop pliability and the capacity to effectively respond to crisis. By creating time for a process called business impact analysis, organizations can react swiftly and efficiently to safeguard processes thereby decreasing damages and expenditure. Humanitarians should evaluate their weaknesses, establish the implications and come up with strategies for operating under pressure

6.0 Recommendations of the Study

The study findings indicate that humanitarian aid is not a one-man show and all the parties involved are potential influencers of the operations. With the disasters getting more frequent and severe, humanitarian aid organizations that rely on global supply chains to secure their inbound materials and outbound product flows are highly affected. Humanitarian aid organizations need to stay resilient, no matter what hits. The study recommends to donors to build and strengthen the local capacity of the affected nations and populations to prevent, prepare for, alleviate, and contain humanitarian crises, with an aim of making sure that governments and societies can efficiently perform their obligations and coordinate effectively with humanitarian actors. This also includes promotion of local industries and local supplies increasing supply chain responsiveness and supply chain resilience in the event of global supply chain disruptions. Particularly in sudden onset crises, neighboring communities on a voluntary basis undertake immediate humanitarian assistance. It may take some days for organized national or international humanitarian aid to get to the affected places. Local capacities save lives in the first vital hours thus responsiveness.

Humanitarian aid organizations should seek the help of technology in ensuring resilience in their supply chain. The presence of technologies such as in-memory computing and improved analytics algorithms, help organizations solve complicated supply chain questions with ease and without wasting quality time. Rapid analysis and data accuracy are two crucial factors for organizations aiming for resilient supply chains. Organizations need to deploy versatile digital supply networks to be ready to deal with the unexpected and unpredictable events that continue to unfold. There is need to reimagine humanitarian supply chains and move from a static view of supply chain to envisioning a supply chain as an organic system. Like dancing, there is need to follow both established steps and improvise when necessary.

The study recommends that, in the effort of ensuring supply chain resilience and preparedness, supply chain managers should formulate backup or continuity plans long before disaster strikes to ensure minimal supply chain disruptions. For the disasters that allow for advanced warning, supply chain managers can proactively reroute supplies to other ports or roads, stock up on parts for production and communicate with beneficiaries and vendors. When emergency supply chain management is involved, a fraction of alertness could save the day. Investing seemingly small portions of time and resources for the sake of being prepared can prove to be a great decision when a disaster occurs, reducing the effect on people and infrastructure.

The study recommends the use of outsourcing, spare capacity and use of local suppliers to mitigate against humanitarian supply chain vulnerabilities. In addition, supply chain professionals should come up with new ways of predicting demand in a volatile, uncertain, complex and ambiguous environment learning from data from previous disasters. Humanitarian supply chain actors need to be familiar with supply chain vulnerabilities and the implications to the community and its lifelines so they can come up with reliable plans of responding to disasters and adapt easily in times of crisis.

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AUTHORS

First Author- Erastus Kiswili Nyile: Student, Jomo Kenyatta University of Agriculture and Technology, Nairobi Kenya.

Second Author- Dr Ismail Noor Shale, PhD: Senior Lecturer, Jomo Kenyatta University of Agriculture and Technology, Nairobi Kenya.

Third Author- Dr Anthony Osoro, PhD: Lecturer, Jomo Kenyatta University of Agriculture and Technology, Nairobi Kenya.