ASSESMENT OF FACTORS AFFECTING THE PERFORMANCE OF HUMANITARIAN ORGANIZATIONS SUPPLY CHAIN MANAGEMENT IN DISASTER RELIEF OPERATION: THE CASE OF SOMALI REGION DISASTER RELIEF EFFORTS

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A THESIS SUBMITTED TO THE ADDIS ABABA UNIVERSITY SCHOOL OF COMMERCE IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ART IN LOGISTICS AND SUPPLY CHAIN MANAGEMENT

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This is to certify that the thesis prepared by Mr. Frezewd Tefera , entitled "Factors Affecting the Performance of Humanitarian Organizations Supply Chain Management in Disaster Relief Operation: The Case of Somali Region disaster relief efforts", which is submitted in partial fulfilment of the requirements for the Degree of Masters in Logistics and Supply Chain Management, complies with the regulation of the university and meets the accepted standards with respect to originality and quality.

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Declaration

I, the undersigned, declare that this thesis entitled “Factors Affecting The Performance of Humanitarian Organizations Supply Chain Management in Disaster Relief Operation: The Case of Somali Region disaster relief efforts” is my original work and has not been presented for any degree in any other university, and that all the sources of constituents used for the thesis have been properly acknowledged.

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Certification

This is to certify that Frezewd Tefera has carried out his thesis work entitled “Factors Affecting the Performance of Humanitarian Organizations Supply Chain Management in Disaster Relief Operation: The Case of Somali Region disaster relief efforts” under my guidance and supervision. Accordingly, I hereby assure that the study is his own original work and suitable for submission of the award of Master of Arts in Logistics and Supply Chain Management.

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The Researcher

Abstract

Supply Chain Management is crucial aspect of disaster relief operations as it deals with getting relief supplies needed from the source to the beneficiaries with the aim of saving lives. The challenges of supply chain management prevent the humanitarian organizations from meeting their objectives. The focus of this thesis is the disaster relief operations at the Somali region; which is one of the highly disaster impacted regions in Ethiopia; where natural and man-made disasters are common: drought, floods, and disease epidemics affect millions of people each year all in need of immediate disaster relief activities.

This study is carried out to assess factors affecting the humanitarian organizations supply chain management performance in disaster relief operation with a specific focus on the Somali region disaster relief efforts with the objectives of assessing humanitarian supply chain management practices at the Somali region, to identify the major factors affecting humanitarian supply chain management performance at the Somali region, to measure the humanitarian organizations, supply chain management performance at the Somali region.

The research focused on humanitarian organizations working in disaster relief operation environment. Factors affecting humanitarian supply chain management were identified from different literatures and humanitarian supply chain professionals from eight organizations were asked to measure the factors affecting humanitarian organization supply chain management in disaster relief operations at the Somali region disaster relief efforts. Findings of the research revealed that both internal and external factors have a greater impact on the performance of humanitarian supply chain management in disaster relief efforts.

ABBREVIATIONS AND ACRONYMS

CRS: Catholic Relief Service

DPPB: Disaster prevention and Preparedness Bureau

EMAA: Ethiopian Maritime Affairs Authority

ERC: Ethiopian Railway Company

GoE: Government of Ethiopia

GRN: Goods Received Note

HRD: Humanitarian Requirements Document

HLS: Humanitarian Logistics Software

IFRC: International Federation of the Red Cross and Red Crescent Societies

IOM: International Organization for Migration

IRC: International Rescue Committee

INGO: International Non-Governmental Organization

JEOP: Joint Emergency Operation Program

MERET: Managing Environmental Resources to Enable Transitions

MSU: Mobile Storage Units

NDRMC: National Disaster Risk Management Commission

OXFAM: Oxford Committee for Famine Relief

SCI: Save the Children International

TSF: Targeted Supplementary Feeding

UN: United Nations

UNOCHA: United Nations Office for the Coordination of Humanitarian Affairs

UNICEF: United Nations Children's Fund

WaSH: Water, Sanitation and Hygiene

WFP: World Food Programme

WHO: World Health Organization

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CHAPTER ONE

INTRODUCTION

This chapter presents a brief background of the study, statement of the problem, research questions, and research objectives, significance of the study, scope of the study, definition of terms and organization of the study.

1.1. Background of the study

The changing nature of conflict, climate change, increasing competition for access to energy and natural resources, extreme poverty and poor governance do not only enhance the threat of disasters, the truth is that the impact of these factors is quite frequently severe. Although, in 2008, the total number of disasters decreased compared to previous years, the disasters that occurred were characterised by a much more devastating impact. Referring to this, the United Nations International Strategy for Disaster Reduction(UNISDR)has recently published the following alarming data: in 2008, 321 disasters e.g., cyclone Nargis, which moved across Myanmar, as well as earthquakes and floods that struck various areas of the world killed 235,816 people, affected 211 million others and cost a total of US $ 181 billion (UNISDR, 2009).

Ethiopia battles residual needs from the 2015/2016 El-Niño induced drought, below average 2016 autumn rains in the southern and south-eastern parts of the country have led to a new drought in lowland pastoralist areas, as well as in pocket areas across the country. As a result, some 5.6 million people in Ethiopia required emergency food assistance in 2017. In addition, 2.7 million children and pregnant and lactating mothers required supplementary feeding, 9.2 million people needed support to access safe drinking water, 1.9 million households needed livestock support, and 300,000 children between 6-59 months old were targeted for the treatment for severe acute malnutrition in 2017(OCHA ,2017).

Proper response to the humanitarian needs in case of disasters is mitigation and satisfying the initial and vital needs of the survivors. It must be done in the shortest time using the least amount of the resources to reduce the terrible effects of the disaster. Sources of these disasters can be natural or manmade. But all operations follow the same goal, which is saving human beings. These operations are done in an uncertain situation and destabilized infrastructures. Most of these disasters are unpredictable and there is no estimation of the volume of aids that will be demanded (Van Wassenhove, 2008).

One of the most important issues in disaster relief operations has been the supply chain activities. In a disaster relief operation, supply chain activities are aimed at responsively and cost-effectively matching demand and supply of goods such as foods, shelter, tents, and medicine. In every relief operations, supplies came from everywhere, domestically and/or internationally. Generally, the main problem has not been in the amount of supplies available, but in the distribution of food, shelter, tents, and other goods quickly and in sufficient quantity to the people in need. After the Tsunami attacked several Asian regions in December 2004, the overwhelmed of goods arrived at the airports exceeded the capacity of the aid agencies in the field to sort, store, and deliver goods effectively (Thomas, 2005).

The explanations above illustrate the omnipresence, variety and intensity of disasters. Furthermore, they reveal the associated consequences and the relevance of humanitarian assistance in terms of disaster response. Disaster response focuses on preserving life, preventing and alleviating human suffering and maintaining human dignity wherever necessary and in cases where governments and local actors are overwhelmed, unable or unwilling to act.

The focus of this article will be on assessment of factors that affect humanitarian organizations supply chain management performance in disaster relief operation that have taken place during the Somali region disaster response efforts, the study aims to investigate what operational practices had taken place, what major factors were hindering the performance of HSCM and how these factors have been dealt with, and how the performance of these humanitarian organizations were in their disaster response operations in relations to how effective their supply chain operation was during the time of the disaster response; with a greater focus on “disaster response” rather than ongoing conditions. Additionally, I will discuss major activities of humanitarian supply chains; with clear description of the characteristics of supply and demand of disaster supply chains, followed by a discussion on the particularities of the execution and management of these supply chains.

1.2. Statement of the problem

Disasters in Ethiopia have been increasing and have left devastating effects to the human population. The supply chains of majority of the humanitarian organizations is not well developed as reflected by the slow response to disasters (Danish Refugee council, 2011). Several supply chain challenges face the humanitarian organizations and lender them limited in responding to disasters. Amongst the many key players in the process disaster response are international humanitarian organizations. Just like the business world, humanitarian organizations are required to adopt various supply chain concepts, to

help in making informed decisions, and more importantly, to help them undertake their operations in more profound manner (Munguti, 2013).

During the Horn of Africa crisis, 4.5 million people in Ethiopia needed food aid compared to 10.2 million in the year 2016. In 2011, the total severe acute malnutrition (SAM) cases were 328,750 compared to the projected 458,000 cases for 2016. The numbers of refugees being hosted by Ethiopia has more than doubled since 2011 too approximately 300,000 in 2011, to 734,931 refugees from South Sudan, Somalia, Eritrea, Sudan and elsewhere as of April 2016 (Gov't of Ethiopia, OCHA, 2017).

Back in 2017, Southern and eastern Ethiopia had continued to battle the impact of the Indian Ocean Dipole-induced drought, exacerbated by disease outbreaks, large scale loss of livelihood assets and displacement. The humanitarian situation countrywide had been further compounded by below average spring rains the third consecutive poor/failed rains in the southern drought belt at the time. In the second half of 2017, some 8.5 million people needed emergency food assistance, some 3.6 million children and pregnant and lactating mothers required supplementary feeding, and some 10.5 million people did not have regular access to safe drinking water and some 2.25 million households needed livestock support. Partners also estimate that 376,000 children were severely acutely malnourished until the end of 2017(Gov't of Ethiopia, OCHA, 2017).

Following the Government led multi agency and multi sector meher needs assessment in November December 2016, the Government of Ethiopia and humanitarian partners launched the 2017 Humanitarian Requirements Document (HRD) on 17 January. The assessment identified 5.6 million people requiring emergency food assistance in the year 2017. In addition, some 2.7 million children and pregnant and lactating mothers with moderate acute malnutrition will require supplementary feeding (TSF); some 9.2 million people will require WaSH support; and some 1.9 million households will need livestock support. The Government and partners also estimated that 303,000 children will become severely acutely malnourished and some 2 million school children will require support in school feeding and school WaSH during the year (UNOCHA,2017).

Ethiopia El-Nino drought response lessons learned report that was published by UNOCHA in January 2018 discusses; the government of Ethiopia led the response to the drought and the National Disaster Risk Management Commission (NDRMC) had overall responsibility for coordinating the delivery of humanitarian assistance. Through WFP, global lead agency, the Logistics Cluster was activated in March 2016 to support the GoE and NDRMC in their response and to identify logistics gaps and

bottlenecks; propose mitigating measures and to augment the logistics coordination, information management and logistics capacity of government and other humanitarian actors.

In April 2016, a supply chain gaps analysis was conducted by the Logistics Cluster team, in consultation with local partners. The analysis identified the following challenges: congestion at the port of Djibouti, Limited availability of transporters and inadequate contracting procedures; limited availability of adequate storage capacity, delays in distribution; delays at custom clearance, lack of logistics supply chain coordination, and lack of timely and useful information sharing.

Added to this, humanitarian situation report (2017) indicated that, among the number of factors affecting the El-Nino disaster response; the following major challenges were identified: a) lack of funding that has delayed the timely response, b) port congestion at port Djibouti which was the main upstream point of entry for humanitarian and commercial cargo for Ethiopia, c) Pipeline break that resulted from long procurement lead time and lengthy custom process, d) Security problems that are caused by repetitive ethnic clashes in the region, e) Inadequate storage capacity, f) lack of visibility with regard to information with in the supply chain, g) shortage of human resource, and knowledge gap.

It was clear that there are challenges in getting humanitarian commodities through the supply chain in a disaster response operation, which in fact delays response capability Delays in assistance, particularly food, will increase human suffering, lengthen the recovery period of affected people, put increasing pressure on the humanitarian and development systems in place, and the interventions become more expensive.

Thus, this study aims to assess those factors that affect the effective performance of humanitarian organizations supply chain management, study current practices and identify those practice that could be incorporated for future planning, and measure performance of humanitarian supply chain management in disaster response operations.

1.3. Research question

Humanitarian supply chain disaster relief operation is mostly impacted by uncertainties over disasters occurrence and their impact; that directly and negatively affects the response plan of humanitarian disaster relief organizations. The destructive impacts caused by disasters requires and immediate and effective preparedness strategies in place. Thus, it is essential to adopt a retroactive approach; that is, identifying the operational breaks in previous response efforts and then improving them so that humanitarian organizations can respond to disasters in an improved way.

Based on the background of the study and statement of the problem this research will attempts to address the following research questions:

1. How humanitarian supply chain is being practiced in the disaster response operations in the Somali region?
2. What are the major factors affecting the humanitarian supply chain management performance in the Somali region disaster relief operation?
3. What is the humanitarian organizations supply chain management operations performance during Somali region disaster response efforts?

1.4. Research Objectives

The goal of humanitarian organizations in disaster relief operational environment is how to respond to disasters in the most efficient manner to minimize the loss of life and maximize the efficiency of the rescue operations even with various level challenges that they face from different actor and factors. For example; humanitarian organizations often face with problems of transporting large sum of different commodities including food, clothing, medicine, medical supplies, machinery, and personnel from different points of origin to different destinations in the disaster areas. The transportation of supplies and relief personnel must be done quickly and efficiently to maximize the survival rate of the affected population and minimize the cost of such operations.

The research aims to find out practical ways in which disaster relief operations can be responded with an effective and efficient humanitarian supply chain operation.

General Objectives:

To assess the factors affecting the performance of humanitarian supply chain management at the Somali region disaster relief operation.

Specific Objectives:

- To assess humanitarian supply chain management practices at the Somali region,
- To identify the major factors affecting humanitarian supply chain management performance at the Somali region,
- To measure the humanitarian organizations, supply chain management performance at the Somali region.

1.5. Significance of the study

Supply chain of disaster response operation in humanitarian arena is a very time sensitive operation since it is all about saving lives with timely action. The increase in the number of disasters highlights the need for a better planning and operation of disaster response.

During disaster response supply chain various humanitarian organizations often face significant problems of procuring and transporting large amounts of many different relief commodities including food, clothing, medicine, medical supplies, machinery, and personnel from different points of origin to different destinations in the disaster-prone areas and this must be done quickly and efficiently to maximize the survival rate of the affected population.

This research aims at developing strategies for better response of disasters, to enable humanitarian supply chain personnel response to unforeseen disasters and devise applicable solutions to decrease human sufferings in the most economically sensible way. The outcome of this research will aid humanitarian organizations in implementing a well-established disaster relief supply chain management operation in Ethiopia with lessons learned from the past response practices in the Somali region disaster relief operations.

In addition; the study of humanitarian supply chain management has not sufficiently studied with the case of Ethiopian disaster relief efforts, so the result of this study will help to better understanding of the process of humanitarian supply chain in disaster relief operations. And will also contribute to understand and review of humanitarian organizations supply chain activities in relation to their performance during disaster response operations in Ethiopia and propose a solution to pre plan and respond in a coordinated and organized way.

Meanwhile, in Ethiopia, the study of humanitarian supply chain management in the disaster relief operation has not sufficiently been studied, the result of this study will contribute for the knowledge pool in relation with the functioning and performance of the humanitarian supply chain in Ethiopia. Additionally, the result of this study is expected to serve as a basis for other studies to be initiated by academic and organizational researchers.

The result of the study will be beneficial for and could be used for policy formulation in articulating future policies and strategies on humanitarian supply chain management in disaster relief operations, donors will also gain a better understanding of the environment within which humanitarian relief organizations operate to realize efficiency and effectiveness in their relief operations, ensuring fair competition among suppliers, ensuring accountability, transparency and ethics.

1.6. Scope of the study

The study will only be focusing in the Somali region, in contrast to other regions; the Somali region was heavily affected by the El-Nino; drought where large number of population was in need of humanitarian relief assistance that had used humanitarian supply chain as its main channel for disaster relief supply; and this study will primarily focus on studying the factors that affect the performances of humanitarian supply chain management during the disaster response efforts.

Despite the availability of several issues related to humanitarian supply chain management in disaster relief operations, this research limits itself to factors that affect the performances of humanitarian supply chain management in the Somali region.

The study will also encourage other researchers to focus on the humanitarian supply chain management on disaster relief efforts and conduct thorough analysis on the subject matter to enable both humanitarian (non-governmental organizations) and the government's disaster relief department and enable them to respond to disasters in a better and well-coordinated way to save lives, alleviate human suffering and attain better preparedness in the country for unforeseen disasters.

1.7. Definition of Terms

- **Supply chain management:** Supply chain management is the supply chain is a network that includes vendors of raw materials, plants that transform those materials into useful products, and distribution centres to get those products to customers. Known also as the value chain, it is the sequence, which involves producing and delivering of a product or service (Zailani& Rajagopal, 2005).
- **Humanitarian supply chain:** Humanitarian supply chain management (HSCM) is defined by the International Federation of Red Cross and Red Crescent Societies as 'acquiring and delivering requested supplies and services at the places and times they are needed, whilst ensuring best value for money; in the immediate aftermath of any kind disaster or reconstruction situation, including items that are vital for survival, such as food, water, temporary shelter and medicine' (ICRC, 2014).
- **Disaster:** the term disaster as defined by different scholars and united nations ''a serious disruption of the functioning of society, causing widespread human, material or environmental losses which exceed the ability of the affected people to cope using only its own resources'' (United Nations, 1992).

- **Relief:** relief in the context of this research paper refers to; the emergency food, shelter and services provided in the immediate aftermath of a natural or man-made disaster (Thomas, 2003) and often entails a foreign intervention into a society with the aim of helping local people (Long and Wood, 1995). Therefore, the basic goal of disaster relief agencies is to minimize the impact of disasters and reduce the suffering of affected people (Kelly, 1995).
- **Humanitarian organizations:** humanitarian organizations are organizations that are usually involved in: searching for, collecting and transporting the wounded and sick, missing and dead; providing medical treatment to the wounded and sick; assisting prisoners of war; and assisting the civilian population through the provision of humanitarian relief. (ICRC 2014)
- **Humanitarian Assistance:** Humanitarian assistance is an aid that seeks to save lives and alleviate suffering of a crisis affected population and must be provided in accordance with the basic humanitarian principles of humanity, impartiality and neutrality (Relief web glossary of humanitarian terms, 2008).

1.8. Organization of the study

This paper is organized in to five distinct chapters. Chapter one provides a general introduction, provides brief background of the study, discuss objectives, research problems and research questions, scope and limitation of the study. The second chapter presents the literature reviews related theoretical literature and empirical study on similar related topics are reviewed and conceptual framework developed and included. The third chapter discusses the research methodology that focuses on the design and approaches of the research, data source, population, data collection procedures and data analysis methods are to be discussed. Fourth chapter presents results and discussion of findings, and the fifth chapter provides summary, conclusions, recommendations and consideration for future research presented.

CHAPTER TWO

RELATED LITERATURE REVIEW

This chapter will be unfolding and conceptualizing literatures related factors that affect the performance of humanitarian supply chain management in disaster relief operations based on research works done in the past and literatures done by other scholars in the field of humanitarian supply chain management and disaster relief operation in conjunction with supply chain efforts. Main purpose of this chapter will be to document critical knowledge around factors that affect the performance of HSCM around humanitarian supply chain in disaster relief operations in general to have the over-all overview of the concepts and with a special focus of the Somali region disaster response efforts.

2.1. Theoretical Literature Review

2.1.1. Supply Chain Management

Supply chain management allows companies and organizations to optimize their logistical performance at inter-organizational levels. (Tomasini & van Wassenhove 2009:2) Supply chain management can be extensive and intricate or simplistic and straightforward; nevertheless, the process is made up of certain key elements which are crucial in moving products to their final destinations. Although the concept of supply chain management has been around since the early 1900s and is evident in the development of the assembly lines, the term was first introduced in the Financial Times in 1982 (Choudhary, Ansari, Ahmed &Hammayun, 2014). Although there are very many definitions for SCM, the Council of Supply Chain Management of Professionals define it as:" Supply chain management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third party service providers, and customers. Supply chain management integrates supply and demand management within and across companies" (Kovacs &Spens, 2012).

2.1.2. Humanitarian Supply Chain

Humanitarian SCM emerged as a worldwide-noticeable theme as disasters, either man-made or natural, may occur at any time around the world with enormous consequences (Carroll and Neu, 2009; Tomasini and van Wassenhove, 2009; Kovács and Spens, 2007; Yamada *et al*, 2006). Consequently, the provision of timely and appropriate humanitarian aid has developed into a global and multinational industry (Carroll and Neu, 2009) and more and more focus is being placed on the optimization of the logistics and supply chains that are charged with transforming public and private donations into tangible aid. There now exists a fierce need to coordinate the logistics resources of the public and private sectors to avoid arbitrary resource allocation during disasters; however, ineffective coordination of efforts between relief suppliers, logistics servers and demanders is still a major concern (Carroll and Neu, 2009; Tomasini and van Wassenhove, 2009). It has been recognized that the humanitarian relief effort concerns itself with: "A process of planning, managing and controlling the efficient flows of relief, information, and services from the points of origin to the points of destination to meet the urgent needs of the affected people" (Ernst, 2003),and that in humanitarian relief operations: "Logistics planning and coordination need to be seen as essential rather than merely desirable" (Rickard, 2003).

Humanitarian supply chain does require the process of effective and cost-efficient plans, implementations and controls for aid flows (those financial and in-kind donations) from the point of origin to the point of consumption with the intent of meeting the relief aid recipients' requirements (Thomas and Mizushima, 2005). As a subset of supply chain management, it covers all the functional processes such as sourcing, procurement, inventory management, logistics and distribution, information management, and so forth (Day, 2012). The primary goal of humanitarian supply chain is to minimize human suffering more specifically to prevent further loss of life and harm to humans, as well as provide immediate treatment to those with injuries and illness (Beamon and Balcik, 2008). Now a day, this area attracted the attention of both academics and practitioners (Dubey, 2015).

Sourcing

Source is of importance given their dependence on resource injection. The source consists of either monetary or nonmonetary resource. In other words, source from outside is imperative to an NGO's operations. According to Beamon and Balcik (2008), NGOs' source of revenue mainly comes from governmental funding in addition to charitable and in-kind donations, which refer to nonmonetary contributions such as goods and commodities.

Sources are categorized in to three types, including “in-kind donation”, “monetary donation” and “government funding”. This is reflected in the external coordination activities usually conducted by an NGO’s functional teams of public relationship, source raising, etc. In fact, due to the significant role of donors, most NGOs currently regard donors as their customers as well (Beamon and Balcik, 2008). Hence the design and management of humanitarian supply chains emphasize donors’ heterogeneous goals.

Procurement

The procurement of the relief items can be done from both local and global sources in the wake of a disaster. The local sources are better when the procurement follows the disaster since in the case of local sources, the lead time will be less, and the responsiveness will be more. But in the post-disaster recovery phase, the procurement from the local sources will be costly since the sudden increase in the demand will lead to scarcity and thereby increase in the cost. When we consider the global supply sources for the recovery stage, it requires competitive bidding and a lot of time will be consumed. Under such circumstances, the decisions need to be taken even before the actual occurrence of the disaster and long-term collaboration with the local and global suppliers should be maintained (Balcik et al., 2010).

Jane Kiende (2013) in her paper supply chain performance in humanitarian organizations stated that; emergency supplies enter the relief chain through different sources, forms, and locations. They can be given as donations, grants, or gifts-in-kind (non-monetary goods and/or services). These donations can be solicited or unsolicited. Often unsolicited donations are goods that are not a priority and have not been requested. Aid can be multilateral, administered by international institutions which collect resources from countries and redistribute them, or bilateral, given directly from a donor government to a recipient country. Procurement can be done at the local level or sourced globally. Goods can be acquired in many ways such as in bulk or stored at the vendor until needed.

Transport

To map the risk areas and identify the availability of resources by type of transport (road, waterway, air) able to be mobilized in the shortest time in the occurrence of natural disasters. Humanitarian organizations must undertake a survey of transport service providers, as well as government entities or private organizations with fleets available that can assist in case of humanitarian operations, identifying the types of vehicles and their capabilities. In general, humanitarian operations largely use road and air transport. However, evaluation must be done on how best to use other modes (water and

air transportation - helicopters), to more efficiently support distribution activities in both the strategy of shipment and logistical support to the operation.

Transportation along with capacity planning, scheduling and capacity utilisation is the most important aspect in the HSCM (Long, 1997). Pettit and Beresford, (2009) highlighted that in the case of emergency situations the aid agencies tend to compete against each other for the same transportation facility which tends to increase the cost as there will be a large mismatch between the actual demand and supply. The long term and the short-term demand affect the capacity planning and affects the decisions regarding the number of warehouses, employers, transporters and distribution centres (Pettit and Beresford, 2009). Cottril (2004) suggests that by collaborating with the commercial organisations the capacity aid could be improved. Huang et al. (2011) observed that utilising the operating many vehicles from the local sources is beneficial for the last mile distribution of the aid materials with only a slight increase in the operating costs when compared to the operating large fleets by the humanitarian organisations.

Storage and Handling

Definition of points to receive goods (domestic and international donations) to objectively define the distribution by warehouse and storage in classes or "supply kits" to facilitate the distribution. At these points, the following actions occur storage, handling, screening (to identify unwanted or rejected material), shipment and discharge of material rejected. In points with incoming international donations, it will be necessary to have a staff with knowledge of customs clearance, to avoid congestion at the entry point. Finally, it should qualify staff to work in the area, to reduce errors and avoid the congestion of airports and blocked warehouses. It should also analyse potential points for storage, belonging to government entities or private organizations, as well as identify the availability of equipment (forklifts, pallet conveyors, etc.) able to be mobilized in the shortest time possible.

In the case of HSCM, the organisations have low visibility in the case of the inventory and many times, the control of the inventory is being given to the country officials which may lead to the improper planning like scarcity in some areas and surplus in other (Ergun et al., 2010). The nature of complexity in which a HSCM operates necessitates the need of simpler methods for inventory management. In most of the cases, the relationships with the suppliers are built when the need arises and not on a long-term basis (Kovács and Spens, 2011).

Distribution

The definition of the number of distribution points should be made to minimize the distance to the beneficiaries, but they should be placed in community centres already established, and meeting places

such as clubs, churches, etc. An efficient distribution program requires information data about the goods available and the people affected. The use of military activities in cargo handling and access roads clearance facilitates the humanitarian mission.

In HSCM, the distribution strategies are not like the commercial chains. There are considerable differences between the commercial and humanitarian inventory worlds and these differences can be found in the environment in which they operate and the characteristics of the humanitarian inventory. Therefore, the distribution strategies followed also should be different (Whybark, 2007). The flow of the products is designed keeping in mind the people who require it. The HSCM does not have a manufacturing unit to start with instead only warehouses are available. Moreover, during the disaster, there is a large amount of influx of the donations (Fritz Institute, 2005). These new arrivals are to be sorted out and they must be checked before being given to the people. It is not an uncommon thing to notice that the donations may not always be useful at that time or may have to be stored which again consumes space (Van Wassenhove, 2006). Thus, the disposal of the unwanted products also must be taken care of. The distribution strategy followed in the HSCM mostly resemble the warehousing form of commercial chain where the products are stored in the warehouse and they are being sent to the retailers and then to the customers. In HSCM, the condition is similar where there will be a central distribution centre from where the supplies are being sent to the different spots to be delivered to the people.

Whybark (2007) pointed out three issues relating to the distribution in the HSCM. They are the political conditions, the timeliness issues and the inability to follow the pull system at earlier stages. The political relationships between the countries might not always be a motivating factor. Sometimes, in case of certain politically volatile situations, the warehouse might be situated in the country which may not allow the resources to flow through them to the beneficiaries in the other country. Under such cases, the distribution might become a very tricky job which would require international pressure or interference. Even under such conditions, the timeliness is a very important issue to be dealt with. The lives of the people are at stake and every minute of delay might lead to a loss of life. So, the humanitarian organisations must mitigate these kinds of issues that might occur, and the warehouses must be well placed, or secondary sources should be able to be deployed without any loss of time. The demand information being obtained may not be always right and waiting for the accurate information to arrive is also not advisable. Under such cases, the experience of the logisticians' come into action and push system of distribution must be followed. But, as the situation starts to normalise, and the more reliable information starts flowing in, the pull strategy can be adopted.

Information management

The modern supply chain pundits emphasise the importance of information like this: “In modern supply chains, the information replaces the inventory” (Simchi-Levi et al., 2010). Perry (2007) suggests that information management is crucial in the HSC and the effectiveness of the supply chain mainly depends on how well the information is being utilised. Long and Wood (1995) stated that the management of information during a crisis will turn out to be single most important determinant of success. Information technology allows integrating the activities of the HSC and helps in the effective functioning of the system (Roh et al., 2008; Pettit and Beresford, 2009). Power (2005) suggests that a decision support system will help in the better decision making during a crisis. Since no two crisis situations are the same, the decision support systems can be diverse in nature. The coordination between different actors can be information sharing, centralised decision making, conducting joint programmes, regional division of tasks, etc., (Balcik et al., 2010).

Information system and technology utilisation have improved to a very great extent and this has been very helpful in coordinating the relief activities, mitigating the disasters like earthquake, floods, hurricanes, wildfires, etc. Communication systems have helped to timely pass the warning signals and evacuating the people thereby reducing the impact of these disasters on the human life (Whybark, 2007). In the wake of the disaster, the humanitarian organisations must set up the complex supply chain to procure and distribute the aid materials to the beneficiaries which involves the planning, implementing and controlling the efficient cost-effective flow of the materials cash and related information flow as in any CSCM (Scholten et al., 2010). Whenever there is a chaos, the wrong and misleading information also come into the scene with the valuable piece of information. The information flowing in may be erroneous and sometimes inappropriate and unusable (Balcik et al., 2010).

Reverse Logistics

Reverse Logistics is a process of moving or transporting goods from their destination for capturing value or for proper disposal.

When a request for international support is given by the country in danger, donors contribute by supplying in-kinds, financial assets, volunteer job and general assistance to the zone in danger. Once this relief of aid arrives to the conflict zones, three opportunity areas are often identified: the excess of supply (Oversupply of items), the supply of unsolicited goods, and the supply of non-effective items, due to past expiration date. These three concepts, when presented, challenge the agile supply of items to the people in need, creating extra chaos to the ports of entrance, bottlenecks for the responsive

distribution, and generating a certain level of "waste". The restricted access due to an agglomeration of assets in the ports of entrance, confuse the development of an effective relief of aid from the beginning. Extra factors such as a deficient and slow customs clearance due to either cultural factors or lack of exact necessary papers -bureaucracy- only increase the disorder from the commencement. This issue is reflected in bottlenecks, a lack of coordination of all stakeholders, a gap in information flow, and as Pedraza (2010) mentions, warehouses congestion resulting in unhandled vital aid.

Most researchers agree on that disaster relief consist of three main phases that must be managed but some of them have defined to a deeper extent. (Tufinkgi, 2006) developed a more detailed three-phase model from a disaster management perspective based on process descriptions drawn up by the Disaster Management Centre of the University of Wisconsin (Tufinkgi, 2006). He differentiates between three phases of pre-disaster (comprising prevention, mitigation, and preparedness); response (consisting of warning, impact and emergency response); and post disaster recovery (transition/rehabilitation and reconstruction and development).

"Once a disaster occurs demand for large amounts of a large variety of supplies occurs suddenly in massive amounts." (Balcik and Beamon, 2008) Their work introduces the Relief mission cycle model identified by (Thomas, 2003) and (Beamon, 2004) and modified it to describe the general flow of resources to the affected areas. The model consists of four phases. First phase (assessment) is assessment of resource after a disaster has occurred. In the second phase (deployment) supplies are deployed to disaster areas to reach relief victims. In the third phase (sustainment) operations are sustained for a period and in the fourth phase (reconfiguration) operations are reduced and, in the end, terminated.

2.1.3. Humanitarian Actors

The humanitarian relief community has expanded extensively since World War Two. The United Nations now has branches such as the High Commission for Refugees and the World Food Programme collaborating with a wide variety of other NGOs both at the national and international levels (Therien& Lloyd, 2000; Oloruntoba& Gray, 2006). "In a humanitarian disaster, there is always a need for coordination to maximize the efficiency and effectiveness of the humanitarian effort to meet the needs of affected communities" (Humanitarian Coalition, 2015).

Main actors of humanitarian supply chain in disaster relief operations are donors, aid agencies, Non-Governmental organizations, Governments, Military, and third-party logistics service providers are widely involved in sourcing, moving and providing relief aid along the supply chain for population affected by disasters.

Humanitarian supply chain is a rather new and developing field however it has become an important topic in governments, in the private sector and non-profit organizations as exposure to disasters increases heavily due to "climate change, rapid and unplanned urbanization, demographic pressure, construction and more intensive land-use in hazard prone areas, biodiversity loss and eco-system degradation." (Kovacs &Spens, 2009; European Commission, 2014).

As humanitarian operations become more wildly discussed it has attracted a diverse number of actors such as parties from the private sector which are interested in collaborating and contributing to disaster management. (Maspero&Ittmann, 2008). Humanitarian organizations are also working together to improve their overall results "Logistics coordination between NGOs has improved in recent humanitarian operations (van Wassenhove and Samii,2003) with shared equipment, assets or resources such as aircraft, trucks, food stocks, forklifts etc., and with some agencies or even individuals designated as having the best local knowledge and contacts" (Oloruntoba, 2007).

2.1.4. Humanitarian Supply Chain Management Practices

Supply Chain Management Practices covers a set of activities and processes from upstream and downstream and firm's internal operations. This is in line with Ballou *et al*. (2000) that conceptualise supply chain management as three dimensions: intra-functional coordination, inter-functional coordination, and inter-organizational coordination. In this research five aspects of supply chain management practices that are developed from previous research including Perry and Sohal (2000) and Petrovic-Lazarevic *et al.* (2007) are used. These five practices are: supplier and customer relationship, information sharing, internal operation, IT and training.

A. **Supplier and customer relationship**: The growth of supply chain aims to improve profitability, customer response and ability to deliver value to the customers and to improve the interconnection and interdependence among firms. Due to market expanding from domestic market to global market increase customer demands, for instance demanding lower prices, faster delivery, higher quality products or services and increase the variety of item. According to Towil and Christopher, (2007), the end customer in the marketplace today is determined by the success or failure of supply chain management practices. They stated that getting the right product, at the right price, at the right time to the customer is not only improved competitive success but also the key to survival. The same applies to humanitarian supply chain as the goal is to get the right relief supplies, at the right time to the affected population does save lives.

In supply chain management practices, supplier relationship activities play an important role. Long-term relationships refer to intention that the arrangement is not going to be temporary (Chen and Paulraj, 2004).

B. **Information Sharing:** Simatupang and Sridharan, (2002) defined information sharing as the access to private data between business partners thus enabling them to monitor the progress of products and orders as they pass through various processes in the supply chain. They identified some of element that comprise information sharing, consisting data acquisition, processing, storage, presentation, retrieval, and broadcasting of demand and forecast data, inventory status and location, order status, cost-related data, and performance status. Information shared in a supply chain is of use only if it is relevant, accurate, timely, and reliable (Simatupang and Sridharan, 2005).
C. **Internal operations**: Those humanitarian organization who are said to have simple internal operation are found to better manage their supply chains and achieve effective and efficient disaster response operations. Simplicity in internal operations removes the obstacles of bureaucracy and makes it possible to provide faster response to emergencies.
D. **Information Technology**: Information technology plays an important role in the humanitarian aid and disaster relief environment. The use of information systems to track and trace relief items helps improve the effectiveness of aid delivery and waste minimization (Pettit and Beresford, 2009). Use of information technology to speed up humanitarian work was also found to be a major practice among humanitarian organizations, the reason for this is to enable the organizations to speed up humanitarian activities in disaster relief operations.
E. **Training**: Training in disaster relief operations aims at equipping response personnel with the required set of skill to enable them to operate in the disaster response with full capacity; and achieve the required goal; saving lives.

Davidson (2006), in her study of key performance indicators in humanitarian logistics using disaster operation model at the International Federation of the Red Cross and Red Crescent Societies (IFRC) identified; since other non-profit humanitarian organizations work toward a similar strategic goal of distributing goods to beneficiaries after disasters as quickly and effectively as possible, this framework can be adapted and applied to them as well.

According to Davidson (2006), IFRC works primarily by having field personnel assess the needs of the population after a disaster and report these needs back to headquarters, in the form of specific items and quantities required. The logistics department at the IFRC headquarters then posts the list of

required items to donors, which is what constitutes the "appeals list." Oftentimes the specific goods are donated as in-kind donations; otherwise, money is donated directly to the IFRC, which then procures the goods from suppliers. The goods are then shipped to the destination country. Based on discussions with individuals at the Fritz Institute who work with a multitude of non-profit humanitarian organizations, this process is performed somewhat differently elsewhere. Typically, needs are assessed in the field and reported back to the organization's headquarters.

According to Thomas (2003), once a disaster strikes a relief organization generally go through the following basic process being assessment, procurement, and shipping.

Assessment: An individual from the relief organization travels to the site to perform an assessment (usually within the first 24 hours of a crisis) to estimate the supplies required to meet the relief needs of the affected population. This individual then communicates the results of the assessment to an off-site logistician who translates the assessment into supply requirements (Thomas, 2003).

Fund sourcing: needs are assessed in the field and reported back to the organization's headquarters. Management at headquarters then determines a total amount of money they wish to raise from donors to contribute towards the operation. This dollar amount of money is then communicated to donors. Donors respond by contributing money directly to the organization, to account for this additional step in the relief chain of raising funds before procurement can occur, an additional metric needs to be added to the proposed framework as one of the performance indicators of appeal coverage. This metric will allow the organizations to see how quickly they are reaching their fundraising goal Davidson, 2006).

Procurement: A preliminary appeal for donations of cash and relief supplies is often made within 36 hours of the onset of a disaster. If donors respond and the appeal is funded, relief supplies are mobilized. The logistician first attempts to procure the supplies from local sources, and if the relief organization owns a centralized warehouse, the logistician then checks available supplies in those warehouses. Anything that cannot be fulfilled locally or from centralized warehouses is procured from global suppliers through competitive bidding. There can be and are usually multiple suppliers supplying a single relief organization for each relief effort (Thomas, 2003).

Shipping: Depending on the location of the disaster, the shipping capabilities of the supplier, and the negotiated contract, the goods are shipped to the disaster site (Thomas et al (2007).

2.1.5. Factors affecting humanitarian supply chain management performance

Disaster relief operations are characterized by several challenges that need to be adequately managed; since the disaster relief operation with immediate response requirement needs timely action to implement better response mechanism.

The authors Kovács and Spens (2007) distinguish between two main streams of humanitarian logistics: 'aid work' and 'disaster relief'. 'Aid work' mostly focuses on the continuous support of people in need (e.g. development aid). The term 'disaster relief' is usually used for operations that cope with sudden catastrophes (natural or manmade disasters).

In humanitarian supply chain environment humanitarian staff often must confront with many stakeholders, including large number of donors, the media, government, the military and the final beneficiaries (Tomasini and van Wassenhove, 2009). Lack of coordination among humanitarian organizations at the scene of a disaster is ordinary, as there can be as many as several hundred humanitarian organizations at the scene to carry out relief operations, all with different political agenda, ideologies and religious beliefs and all fighting for media and donor attention (Wassenhove, 2006). Oloruntoba and Gray, (2005) stated that humanitarian supply chain often entails high level of uncertainty in terms of demands, supplies and assessments. The performance management particularly the performance of supply chain is equally a challenge for humanitarian organizations (Thomas and Kopczak, 2007).

The humanitarian supply chain is also characterized by high supply chain professionals turn over as high as 80% annual turnover. In addition, performance management remains a major challenge to the humanitarian SC. The key performance indicators are not standardized as opposed to the commercial sector creating confusion and reduced donor support due to accountability issues which are highly emphasized by the donors and other key stakeholders (Beamon, 2004).

2.1.5.1. Internal factors affecting humanitarian supply chain management practices

A. Human Resources: Poor or non-existent training ultimately affects the quality of any disaster response operation. Field managers are faced with an onslaught of requirements during the relief effort, including demands from the affected population and local government, pressure from international media, monitoring agency attention, and restrictions imposed by donors on how aid is administered. During this confusion, field operations managers are also faced with recording

progress and passing information back to their headquarters and media partners as well as providing a record of events for future managers. (Rodman, 2004).

H_1. Human resources positively and significantly affect the humanitarian supply chain management performance.

B. Funding Bias: Donations, which provide the main funding for relief efforts, often increase immediately after a disaster occurs (Ratliff, 2007). However, for the funded relief to be supplied, a financial supply chain must exist, which often creates a problem, because agencies struggle if their money transfer processes are inadequate or they lack formal arrangements with local financial institutions and suppliers (Russel, 2005).

Due to the nature of how these supply chains are funded, investments in research and infrastructure are severely restricted. The main stakeholder in humanitarian supply chains is not the beneficiary who should be in the focus of humanitarian operations but rather the donor (Blecker, 2009). Increasing competition for funds and tightened donor scrutiny can make the reaction and recovery stages seem to like picnics compared with strategic planning and prevention operations.

H_2. Funding bias positively and significantly affects the humanitarian supply chain management performance.

C. Information Technology: Because people tend to donate money expecting to directly help those impacted by the disaster, funding for necessary equipment and information technology has been limited (Oloruntoba and Gray, 2006).Majority of the humanitarian organizations have invested very little capital in the development and implementation of modern management information systems, information technology or logistics systems. Further Thomas (2003), supported the existence of the challenge stating even though more sophisticated SCM tools could result in lowered costs and more efficient operations in the longer term, agencies have limited human and financial resources to invest in such advances. For example, most disaster relief agencies switch from electronic systems to paper early in the handling process (Gustavsson, 2003) and rely on Excel for their tracking, resulting in little visibility into inbound shipments; this shift in turn impedes the undertaking of receiving, clearing customs, shipping to intermediate warehouses, and distribution along the supply chain (Russel, 2005). Moreover, it appears that few field actors endeavor to assess and define specific technological needs and strategic SCM shortages or advocate for the development and implementation of technology solutions (Ratliff, 2007).

H_3. Information technology positively and significantly affects the humanitarian supply chain management performance.

D. **Supply Chain Coordination and Management Challenges**: Coordination and management of disaster supply chains has challenging problems. The supply network is huge and complicated with numerous players that are the donors, non-government organizations, government, military, and suppliers, and it is hard to coordinate all of them along with all the items that need to be delivered. Despite the different cultural, political, geographical and historical differences among them, collaboration and specialization of the tasks between non-government organizations, military, government and private business are increasingly needed in the humanitarian supply chains (Van Wassenhove, 2006).Despite being experienced and aware of the key points in humanitarian supply chains, people in charge of supply chain management in most humanitarian organizations are not often specialized in this area, thus they are not experts in the tools for solving the problems that might occur during the operations. There could also be domestic barriers such as the need of excessive paperwork, and specific policies of the region that may cause additional delays, as well as external complications due to foreign relations.

H_4. Supply chain coordination and management positively and significantly affects the humanitarian supply chain management performance.

E. **Knowledge gap**: Because disaster relief agencies' knowledge often is only tacit, and debriefings following a relief operation often are absent or limited in their ability to suggest improvements to relief supply systems, the lessons learned from one disaster event often fade before the next one, and experience does not move easily among disaster events and responders (Samii and Van Wassenhove, 2003). Moreover, the challenges and lack of career advancement for field logisticians result in extreme turnover rates, as high as 80 percent per year (Thomas, 2005). Many field workers partaking in their first relief operation never sign up for a second; one in three field workers quits because of burnout (Gustavsson, 2003). Thus, the expertise of these agencies generally rests within a small group of highly experienced humanitarian field workers, which makes the development of explicit knowledge and expertise, as well as institutional learning, particularly problematic.

H_5. Knowledge gap positively and significantly affects the humanitarian supply chain management performance.

2.1.5.2. External factors affecting humanitarian supply chain management Practice

A) **Demand Uncertainty:** The most challenging in humanitarian logistics is uncertainty. Usually, there will be no indication as to when a disaster will strike, how many people will be affected, what infrastructure will be left intact, which suppliers will donate, or what other obstacles may

arise. Uncertainty can stem from many elements relating to the mission, the organization itself, or nature of the demand. For example, uncertainty may arise from inherent characteristics such as what and how much material is demanded, product traits, process fluctuations, and supply problems (Van der Vorst and Beulens, 2002).

H_6. Demand uncertainty positively and significantly affects the humanitarian supply chain management performance.

B) **Degraded Infrastructure**: Poor transportation and communications infrastructure is another barrier to effective delivery of aid. Rapid onset of a disaster may degrade the country's existing infrastructure to the point where delivery of aid is severely hampered. "Often transportation infrastructure is in poor condition and cannot handle the huge numbers of refugees, military vehicles, and relief shipments that pour into these areas in times of disaster. (Gooley, 1999).

H_7. Degraded infrastructure positively and significantly affects the humanitarian supply chain management performance.

C) **Transportation Availability**: Transportation is a major component of disaster relief operations. Post disaster transportation, especially across the last mile can be particularly challenging for relief agencies. This challenge arises from damaged infrastructure, limited transportation resources, and the sheer amounts and bulk of supplies to be transported (Balcik*et al.*, 2008).Relief agencies do not typically own and operate vehicle fleets in disaster affected region. As such, agencies typically rent local vehicles and drivers. However, analogous to local relief supply acquisition, vehicles may be scarce, and the sudden surge of demand may inflate the rental costs of available vehicles.

H_8. Transportation availability positively and significantly affects the humanitarian supply chain management performance

D) **Security Issues:** The security assessment should be done as soon as disaster strikes. In most of the scenes after a disaster strikes security will be lost especially in human-induced disasters. Access to some routes and airfields may be destructed to reach the location or clearance and permits may be needed by the logistic supply teams, especially in emergencies (Iqbal *et al.*, 2007). According to Walton, *et al.*, (2011), despite humanitarian workers efforts to strengthen operational security in insecure environments, attacks that have led to death, kidnapping or serious injury, continue to exact a heavy toll on humanitarian personnel preventing the wounded and sick from receiving the care and protection they require.

H_9. Security issue positively and significantly affects the humanitarian supply chain management performance.

E) Port Congestion: According to Gidado (2015), congestion in any ports is usually attached to delays, queuing and extra time of voyage and dwell of ships and cargo at the port affecting the entire logistics and supply chain system. This results in lengthy lead time and extra costs to all stakeholders such as transport service providers and traders in the supply chain.Gidado (2015) further indicated that transporting goods by sea remains the most common way to trade globally despite the fact that cargos in Africa spend unnecessary and long time in ports before they are moved inland, creating obstacle to the successful integration of Africa`s economies in Worldwide trade networks. Gidado (2015) also identified common types of congestion prevalent in Africa which include ship berth and work congestion, vehicle gate and work congestion, cargo stack congestion and ship entry / exit route congestion.

H_{10}. Port congestion positively and significantly affects the humanitarian supply chain management performance.

2.1.6. Humanitarian Supply Chain Performance in disaster response

When disasters strike, relief organizations respond by delivering aid to those in need. Their supply chains must be both fast and agile, responding to sudden-onset disasters. Disasters of great magnitude cause donors, beneficiaries, and the media to closely monitor how quickly and efficiently relief organizations can respond to the situation.

A disaster response operation involves trade-offs of speed, cost, and accuracy about the type of goods that are delivered and their quantities. Balancing these trade-offs requires a means of measuring supply chain performance however, the inability to centrally capture time and cost data related to the procurement and distribution of goods has prevented a systematic process of performance measurement from being implemented.

In HSCs, the goal of the supply chain is not to make profit but to provide the food, medicines and other important things to people who are in distress. The performance measure in HSCM is crucial to the non-governmental accountability. The performance measure should be robust enough to help the practitioners to take the right decisions and to improve the effectiveness and the efficiency of the system (Chandraprakaikul, 2009; Beamon, 1999).

Beamon and Balcik (2008) suggests a few cost metrics for the performance measures in the HSCM like that of the holding cost of the essential supplies at or near the affected zone, the cost of the supplies itself and the distribution cost through the chain. The flexibility metrics to measure the performance of the HSCM are the ability to respond to the different magnitude, time to respond to disaster and the ability to provide the different items at the site of calamity.

Davidson (2006) mentions different indicators for the performance measurement of the HSCs. These indicators are described as follows.

A. **Appeal coverage**: There are two metrics under this indicator: the first being *percent of appeal coverage*: which is defined as the percentage of the number of items that donors have pledged out of the total number of items requested for the operation at a given point in time. It is expressed as the ratio of the number of items pledged and the total items requested. The purpose of this metric is to indicate to the organization how well and how quickly they are finding pledges for the requested items (Larrea, O., 2013).

   Second metric; *Percent of items delivered*: which is defined as the percentage of items that have been delivered on-site out of the total number of items requested for the operation at a given point in time. This metric is expressed in factional form as the ratio of the number of items delivered and the total items requested (Larrea, O., 2013).

   These two metrics together indicate how well an organization is a) finding donors and b) how well is delivering goods to the destination disaster place at a specific point in time (Larrea, O., 2013).

B. **Donation-to-Delivery Time:** The second performance indicator measures how long it takes for an item to be delivered after a donor has pledged to donate it. It's expressed as the difference between the time of pledge delivery and actual delivery time (Larrea, O., 2013).
   Sometimes, the humanitarian organisations pledge the aid but do not deliver it. For example, in the case of the West Sudan, only one third of the promised financial aids were received (Oloruntoba, 2005). Response time is another important performance metric in the HSCM. The factors contributing to the responsiveness of the HSCM are relief organisation assessment, procurement and delivery strategies, supplier location, transportation choice, topology, safety, infrastructure, and politics (Beamon and Balcik, 2008).

C. **Financial Efficiency:** Three metrics comprise the indicator of financial efficiency. The first two metrics use two methods (one relative and one absolute) to compare the budgeted prices to the actual prices paid for items delivered in the operation. The third financial efficiency metric incorporates the transportation cost of delivering the goods to the beneficiaries. This metric is expressed as a ratio of the total transportation costs incurred over the total costs for delivered items at a point in time. The value of this ratio should decrease over time, as less expensive transport methods are used after the initial delivery phase and as more items are delivered onsite (Larrea, O., 2013).

D. Assessment Accuracy: How quickly donations are pledged, and goods are delivered to beneficiaries relies on how accurately the field personnel assessed the needs of the population affected after a disaster has occurred. Assessment accuracy therefore indicates how much the operation's final budget changed over time from the original budget. This metric contextualizes the values of the other metrics on the scorecard. For example, if it appears on the scorecard that the delivery lead time of a specific type of item was longer than average in an operation, the assessment accuracy metric will indicate if the long lead time of that item was caused by an initially low estimation of the quantity needed(Larrea, O., 2013).

According to the SCOR model, five performance attributes should be considered in assessing the performance of supply chain management. The metrics are categorized in five performance attributes: reliability, responsiveness, agility, costs and asset management efficiency. The first three attributes are considered customer-focused which makes them apply to humanitarian supply chain management function; which are reliability, responsiveness, and agility. The latter two are internally focused.

Reliability: The ability to perform tasks as expected. Reliability focuses on the predictability of the outcome of a process. Typical metrics for the reliability attribute includes: On-time, the right quantity, the right quality.

Responsiveness: The speed at which tasks are performed. The speed at which a supply chain provides products to the customer. Examples include cycle-time metrics.

Agility: The ability to respond to external influences, the ability to respond to marketplace changes to gain or maintain competitive advantage. SCOR Agility metrics include Flexibility and Adaptability.

2.1.7. Disaster management and humanitarian Supply chain

The number of stake holders in the disaster management has increased in the last few years. This includes the local and the global humanitarian organisations, governments, military, individuals and companies to name a few. The complexity in the managing of the humanitarian relief operations has also increased. Moreover, due to the increase in the frequency of the occurrence of the disaster the humanitarian organisations rarely get a chance for the review of the effectiveness of their relief operations and their strategies (Besiou*et al*., 2011) According to Thomas and Kopczak (2005),

disaster management is an expanding area of research with the number of disasters, both natural and manmade, increasing over the years. The term disaster can be defined as "an occurrence of widespread severe damage, injury or loss of life or property with which a community cannot cope and during which the society undergoes severe disruption" (Schulz, 2008).

Disasters can be classified into two categories, i.e., manmade disasters and natural disasters. The natural disasters cannot be avoided in most cases, but the impact can be reduced by proper planning and foresight into the future. On the other hand, the manmade disasters like those of war, terrorists attack, etc., can be avoided.

In the present-day world, were the information technology have progressed a lot the tracking following a disaster anywhere on the globe have become a very common phenomenon. This also adds to the risks associated with increasing urbanisation, dependence on critical infrastructure, terrorism, climate and variability, and animal and human diseases along with the great amount of mobility of the people on the globe.

2.2. Empirical Literature Review

Literature review has uncovered that a lot of research on the factors that affect the performance of humanitarian supply chain management in disaster relief operations; and has been undertaken mostly in more developed countries context as there is all the required amount of resources are available, the subject is yet to be researched in developing countries like Ethiopia and Africa in general.

2.2.1. Humanitarian supply chain practices

Korpela and Tuominen (1996) identified the logistics critical success factors and determine their importance. There are five critical success factors: reliability, lead time, flexibility, cost-effectiveness, and value-adding. They also define six enablers applying for the critical success factors: management systems (effective logistics strategic management system); process integration (a process-based approach to integrating production, sales and marketing, and distribution into a customer-oriented logistics system); information systems (effective strategic and operational information systems); organization (the effectiveness and flexibility of the logistics organization); technology (utilization of modern technology in different parts of the logistics system); relationships (long-term and contractual relationships with both customers and providers of logistics services).

Davidson (2006), in her study of key performance indicators in humanitarian logistics using disaster operation model at the International Federation of the Red Cross and Red Crescent Societies (IFRC),

since other non-profit humanitarian organizations work toward a similar strategic goal of distributing goods to beneficiaries after disasters as quickly and effectively as possible, this framework can be adapted and applied to them as well. Management at headquarters then determines a total amount of money they wish to raise from donors to contribute towards the operation. This dollar amount of money is then communicated to donors. Donors respond by contributing money directly to the organization, which procures the goods and ships them to the destination country. This process constitutes the practices of supply chain management in humanitarian disaster relief operation; a) Need assessment, b) Procurement and c) Shipping/Transport.

Supply acquisition/procurement

According to balick and beamon (2008), relief organizations can procure supplies locally and/or globally. Each option has advantages and disadvantages, in terms of expected logistics costs, lead time and supply availability for example, although local supplies may not be available in the quantity and quality needed, local procurement requires shorter lead times and has lower logistics costs. However, strong post-disaster demand and local competition for supplies may inflate local market prices, thereby increasing the unit cost of local supplies. The challenges of global procurement in the post-disaster environment stem primarily from the time-consuming processes involved (e.g., competitive bidding and customs clearance) and transportation capacity requirements for shipping large quantities of bulk supplies. Relief supplies may also be acquired through in- kind (non-financial) donations, which usually become available after a disaster occurs. In-kind donations, particularly if unsolicited, may congest the relief chain, as previously discussed.

Pre-positioning/warehousing

Relief organizations that purchase relief supplies in advance of disasters strategically pre-position those supplies at distribution canters (Balcik and Beamon, 2008). However, due to the uncertainty of disaster occurrences, funding tendencies in the sector, and the costs associated with operating distribution canters, only a few relief organizations use this strategy (Balcik and Beamon, 2008).

Transportation

Transportation is a major component of disaster relief operations. Post-disaster transportation, especially across the ‘‘last mile’’, can be particularly challenging for relief agencies. The challenge arises from damaged infrastructure, limited transportation resources, and the sheer amounts and bulk of supplies to be transported (Balcik et al., 2008).

Davidson (2006), in her research of key performance indicators of humanitarian logistics conducted an interview to IFRC employees to identify what practice are there in an emergency operation, based on the responses she found out that emergency operation can be grouped into four phases, Notification, Mobilization, filling the pipeline and receiving of goods.

- **Phase one: Notification**

The IFRC is first notified of an event by the national society of the country or countries in which the disaster took place. If the items required for aid are greater than the capacity of what the national society can provide and they request aid, then the IFRC establishes involvement in mobilizing goods. Otherwise, the operation will be managed at the national level without any visibility to the IFRC. In certain large-scale disasters in which the requirements will exceed local capacity, the IFRC may skip the "notification phase" and directly enter the "mobilization phase." In most cases, however, the mobilization phase does not begin until the IFRC logistics department receives the initial list of requested items and item quantities from Operations Support, the department that supervises assessment and distribution activities in the field (Davidson, 2006).

- **Phase two: Mobilization**

The "Appeal Creation Date" is the date on which the IFRC commits to responding to an emergency. On this date, the logistics department creates a new project in the humanitarian logistics software (HLS) system. Items requested from the field are entered into a "Mobilization Table," which is the tool in humanitarian logistics software used to track the requested items, item quantities, and expected unit costs. The Mobilization Table can only be updated by the IFRC headquarters. After it is initially populated at IFRC headquarters, it is published online to the national societies of the Red Cross and Red Crescent. These national societies serve as the direct donors to the IFRC for "in-kind donations" (donations of items instead of cash), which are requested on the Mobilization Table. If a national society wishes to donate items listed on the table, they contact the IFRC via telephone or e-mail to record the donation. The IFRC logistics department updates the Mobilization Table as donors make pledges for items, as well as when new information arrives from the field about the items and quantities needed on-site (Davidson, 2006).

- **Phase three: Filling the Pipeline**

After donors register their donation with the IFRC, they notify the IFRC again when the shipping information is available. A shipment of goods is referred to as a "consignment" in humanitarian logistics software. The donor provides information to the IFRC for each consignment, such as item codes, item quantities, the expected shipment date, the expected arrival date, and the mode of

transportation. The above information is then entered humanitarian logistics software by the IFRC logistics department (Davidson, 2006).

As shipments are recorded, the logistics department creates the "Pipeline Report" using humanitarian logistics software and distributes it periodically to logistics personnel as well as the Operations Support personnel working in the field. The purpose of this report is to provide visibility in the supply chain so that the field personnel can see when they can expect to receive future shipments. How often the Pipeline Report is distributed depends on the scope of the operation. In large-scale disasters where the pipeline is changing rapidly due to several shipments arriving via airfreight during the first weeks after a disaster, this report may be distributed as often as 2-3 times per day (Davidson, 2006).

- **Phase four: Receipt of Goods**

When a consignment is received in the destination country, the logistics personnel on-site create a "Goods Received Note" or "GRN" for it and then notify the IFRC logistics department of its arrival. The GRN contains the date the goods arrived in-country, a list of the item codes in the consignment, and item quantities received. The logistics department then records the GRN data in humanitarian logistics software which modifies the consignment to appear as "closed." A copy of the GRN is also sent back to the donor to show them when their goods arrived on-site(Davidson, 2006).

2.2.2. Factors that affect humanitarian supply chain management

Whether there is actual or potential large-scale displacement, agencies must get the right assistance to the right place at the right time at the right cost. The challenges faced in achieving this are many and complex. Authors have identified a variety of challenges typical for humanitarian supply chain management, including assessment and planning problems, limited use of technology, remote and rustic locations of operation and lack of infrastructure (Chandes, Paché 2010, Overstreet *et al*. 2011, Sandwell, 2011).

One notable challenge pointed out is that donor spending behaviours can be short-sighted and superficial. In other words, donors tend to be more willing to provide money for visible or tangible outcomes rather than for preparedness or development of logistics and supply chain management systems (Whiting, Ayala-Öström 2009).

Overstreet *et al*., (2011) identified the major challenges of humanitarian supply chain management as often having to deal with unknown demand, short delivery time, unexperienced logistics staff, awkward media pressure, lack of funding, insufficient equipment and technology, and inappropriate political interference.

The humanitarian response situation reports for Ethiopia El-Nino response (2017) identified the following challenges; lack of funding, port congestion, and pipeline break, security, lack of storage capacity, information gap, knowledge gap and human resource.

Lack of Funding

The major challenge that was hindering El-Nino disaster responses was lack of funding. Except for $8.8 million for school feeding by the Government and little funding received from UNICEF and Save the Children International, no significant funding was available; including for more than 500 closed schools in Somali and Oromia regions (Humanitarian Situation Report, 2017).

Port Congestion

According to humanitarian situation report (2017), the main upstream point of entry for humanitarian, commercial and GoE cargo for Ethiopia at the time was set the Port of Djibouti. However, in April 2016, when the gaps analysis was conducted, the port was congested and some 800,000 mt of commodities belonging to the GoE, NGOs, UN agencies and donors were reportedly waiting to be offloaded and transported in country. Congestion at the port led to delays, demurrage charges, and impacted operational planning. As well as serving Ethiopia, the Port of Djibouti serves as a gateway to additional emergencies in the region, including Yemen.

Pipeline Monitoring

During the disaster response operation; government of Ethiopia's food aid supply chain was suffering from a multitude of challenges; including commodity tracking and allocation, and lack of standard commodity management procedures that could have enabled GoE to standardize and rationalize commodity management and to compile reporting procedures for NDRMC-handled Relief and Productive Safety Net commodities (Humanitarian Response Situation Report, 2017).

Pipeline Break

Considering available resources and confirmed contributions, WFP was able to assist 1.6 million People, including the 50,000 ad-hoc requests in the 1st round. From the 2nd round onwards, WFP will only be able to support 1.28 million beneficiaries in Somali region. NDRMC will face Considerable resource gap from 3rd round (pulses and vegetable oil). JEOP can cover identified needs for the year. The Cluster has received no additional funding in 2017. Given procurement lead time, custom processing and the high volume of requests for assistance being received, relief supplier were soon depleted (Humanitarian Situation Report, 2017).

Conflicts/ Ethnic clashes

The reported clashes along the Somali-Oromia border have been posing the disaster response operation a greater challenge as the relief supplies that pass across the border were being hijacked and looted by perpetrators. Due to severe security concerns in the region, military escorts used to be deployed to accompany relief food deliveries in some zones of the region. Private transporters were still reluctant to deliver food to substantial parts of the region. For security reasons, truck owners from highland areas were not being deployed in Somali region. As the local transport capacity is severely limited as a result significant delays of relief food deliveries were experienced (Humanitarian Situation Report, 2017).

Lack of Storage capacity

The large amount of incoming humanitarian cargo in response to the drought had placed a strain on the available storage capacity. Subsequently there was an urgent need for additional warehouses and temporary storage facilities. Collecting information on the storage utilization and status remained challenging due to the large number of temporary stores (Mobile storage unites) were erected in remote locations throughout the country. The large amount of incoming humanitarian cargo placed a strain on existing storage capacity. The need for additional Warehouses and temporary storage facilities at hub, woreda and FDPs was identified as an additional gap (Humanitarian Situation Report, 2017).

Lack of Visibility

One of the issues that came up strongly in the gaps analysis was the lack of visibility within the supply chain. The distribution rounds took a very long time, and it was hard to get timely information on the status of delivered commodities. In order to enhance planning, reporting, and decision making, there was a need to support and improve the internal information flow both from federal to local level and the flow back from local to federal level. At the request of the NDRMC and donor community. Prior to the Logistics Cluster activation, there was no integrated reporting system for relief food deliveries and distributions. In addition, significant delays of up to 60 days for relief distributions were reported(Humanitarian Situation Report, 2017).

Information

The Logistics Cluster supported the GoE and humanitarian community through information management activities and made available Information Management products. Vessel arrival information and port congestion were highlighted by most of the partners as key documents that

helped in making informed decisions internally and drive coordination amongst partners. Some partners raised concerns about the sustainability of those tools beyond the life of the Logistics Cluster operation, through WFP or the government (Humanitarian Situation Report, 2017).

Human Resources to Manage supply chain

Limited government capacity to manage the requirements during an emergency is a recurring problem in many Humanitarian responses, in both slow and fast-onset emergencies. Therefore, augmentation of government or local partner staffing, including training and capacity building could was an activity undertaken in additional to operations (Humanitarian Situation Report, 2017).

Knowledge Gap

According to the humanitarian situation report (2017), the GoE had no enough trained manpower with the required capacity and skills, during disaster response. It was later that the logistics cluster arranged a supply chain management training to equip its employees with the required skills with the intent of the need for highly trained manpower which has a pivotal importance for an effective disaster response effort.

It was clear that therewere challenges in collecting and disseminating of information to humanitarian organizations deployed to assist the affected population; information on road accessibility, storage availability, commercial transport availability and other requirements to effectively run the response operation were assessed later and used as an input during the disaster response.

Van Wassenhove(2006) identified coordination and management of disaster humanitarian logistics has challenging problems. The supply network is huge and complicated with numerous players (donors, NGOs, government and suppliers), and it is hard to coordinate all of them along with all the items that need to be delivered. Despite the different cultural, political, geographical and historical differences among them, collaboration and specialization of the tasks between NGOs, government and private business are increasingly needed in the humanitarian supply chains. Despite being experienced and aware of the key points in humanitarian supply chains, people in charge of logistics and supply chain management in most NGOs or other humanitarian organizations are not often specialized in this area, thus they are not experts in the tools for solving the problems that might occur during the operations.

Nyamu (2012) carried out a research to ascertain the impact of SCM challenges facing humanitarian organizations in Kenya. The study had two objectives: to establish the challenges facing humanitarian SCM in Kenya and to determine the effects of supply chain challenges on performance of

humanitarian organizations in Kenya. The study adopted a descriptive survey research design where a sample of 40 humanitarian organizations was conducted. Factor analysis was also conducted in order to establish the main challenges facing humanitarian SCM in Kenya. The findings of the study indicated that the main challenges facing humanitarian SCM were lack of recognition of the role of SCM in humanitarian operations, delay in humanitarian operations due to domestic barriers, demand uncertainty, challenges in accessing affected population due to inadequate transport modes, high costs inhibiting accessibility of the affected areas and inability to anticipate disaster. The effect of supply chain challenges on the performance of humanitarian organizations were delay in the delivery of the right products, poor information integration and uncertainty demand among others.

2.2.3. Humanitarian supply chain performance

In the realm of business, performance can be measured through customer satisfaction which can be achieved through strong relationships with the customer and with all other involved parties. In business, the concept of the customer is a person whose needs are meet by suppliers, vendors, or sellers in exchange for payment in one form or another (Kendall 2006, Philp Kotler 2012). Transferring the above concept to application within humanitarian supply chain management, there are two different kinds of customers: one is the donor, and the second is the beneficiary. The donor can be viewed as an "upstream" customer who provides funding to humanitarian organizations, while, the beneficiary or community be a "downstream" customer, for whom resources are being spent by the humanitarian organizations (Antai*et al.* 2015, Oloruntoba*et al.* 2009).

Due to the financial dependency of humanitarian organizations on their donors, these upstream customers tend to wield more influence and negotiation power in humanitarian organizations than the downstream customers do (Antai*et al.* 2015). However, the humanitarian organizations performance is critically dependent on the satisfaction of both the donor and beneficiary, and this is achievable through timely provision of quality goods and services to beneficiaries in a transparent and accountable way (Oloruntoba*et al*. 2009).

Haile Gabriel (2016) in his research 'Assessment of humanitarian supply chain performance of selected humanitarian organizations in Ethiopia', explored the possible relationships among Humanitarian Supply Chain Agility, Adaptability, Alignment and humanitarian supply chain performance of selected Humanitarian organizations in Ethiopia. From the result of the analysis it is concluded that there is positive and statistically very strong relationship between humanitarian supply chain agility and humanitarian supply chain performances. It is also concluded that Humanitarian supply chain adaptability has also positive and strong relationship with humanitarian supply chain

performance. On the other hand, Humanitarian supply chain alignment has also positive and statistically strong relationship with humanitarian supply chain performance. Therefore, to become competitive and achieve sustainable performance in disaster relief chain operations, humanitarian organizations should give due attention to the constructs Humanitarian supply chain agility, adaptability and alignment.

Beamon and Balcik (2008) identified one additional metric to measure supply chain performance, the flexibility metric. The flexibility metric consists of three types of flexibility. The time flexibility can be defined as the minimum response time, which is the elapsed between the onset of the disaster and the arrival of the organisation's first supplies to the disaster site. Volume flexibility for the relief chain measures an organisation's ability to respond to different magnitudes (or severity) of disasters. Mix flexibility for the relief chain measures the number of different types of items that the relief chain can provide during a time period (; Slack, 1991).

Larrea, O. (2013,) found out that the key performance indicators and scorecards developed by (Davidson, 2006) could be manipulated to fit the characteristics of the site of the disaster. Different types of operations produce different values in indicators performance, according to the specific conditions of each disaster. The forced migration operations require more effort and are more difficult to carry out the operations to address disasters caused by natural.

2.3. Conceptual Framework

Factors that affect the performance of humanitarian supply chain management in disaster relief operational environment have a significant effect on humanitarian supply chain performance. It is obvious that supply chain management challenges have an impact on the operations of humanitarian organizations which affects their performance. In the conceptual framework below, factors that affect humanitarian supply chain performance are independent variables that determine the performance of humanitarian organizations supply chain and Performance is dependent variable that is affected by those factors that affect humanitarian supply chain management. Thus; humanitarian organizations in disaster relief operation should identify these factors and develop a mitigation plan for effective disaster response.

Internal factors affecting HSCM performance:

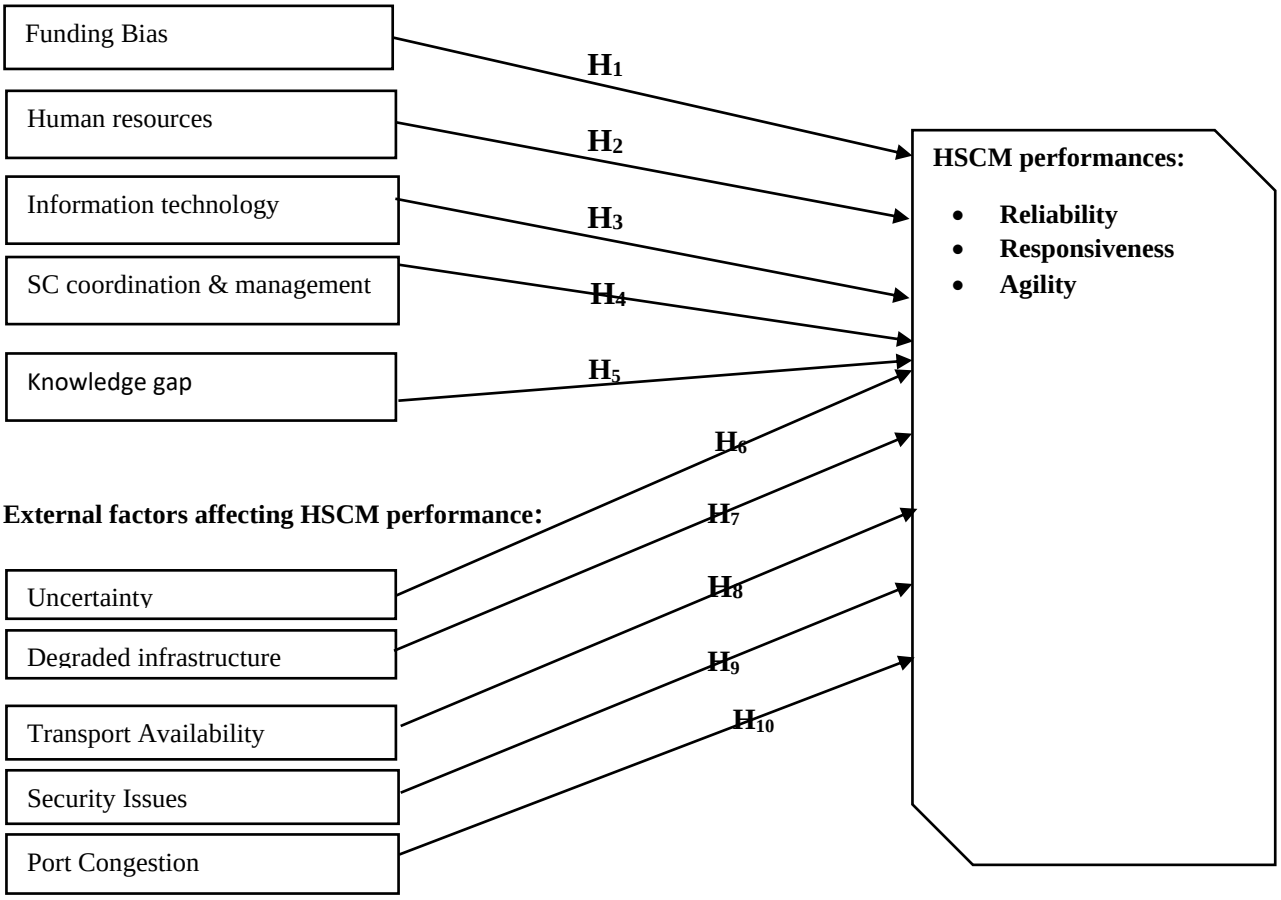

Fig.1 Conceptual Framework adopted from Van Wassenhove (2006), Tomasini &Wassenhove (2009), Oluntroba & Gray (2005), HSCM challenges and Supply chain council framework for performance measurement.

Summary of hypothesis

H_1. Human resources positively and significantly affect the humanitarian supply chain management performance.

H_0. Human resources do not affect the humanitarian supply chain management performance.

H_2. Funding bias positively and significantly affects the humanitarian supply chain management performance.

H_0. Funding bias does not affect the humanitarian supply chain management performance.

H_3. Information technology positively and significantly affects the humanitarian supply chain management performance.

H_0. Information technology does not affect the humanitarian supply chain management performance.

H_4. Supply chain coordination and management positively and significantly affects the humanitarian supply chain management performance.

H_0. Supply chain coordination and management does not affect the humanitarian supply chain management performance.

H_5. Knowledge gap positively and significantly affects the humanitarian supply chain management performance.

H_0. Knowledge gap does not affect the humanitarian supply chain management performance.

H_6. Demand uncertainty positively and significantly affects the humanitarian supply chain management performance,

H_0. Demand uncertainty does not affect the humanitarian supply chain management performance.

H_7. Degraded infrastructure positively and significantly affects the humanitarian supply chain management performance.

H_0. Degraded infrastructure does not affect the humanitarian supply chain management performance.

H_8. Transportation availability positively and significantly affects the humanitarian supply chain management performance.

H_0. Transportation availability does not affect the humanitarian supply chain management performance.

H_9. Security issue positively and significantly affects the humanitarian supply chain management performance.

H_0. Security issue does not affect the humanitarian supply chain management performance.

H_{10}. Port congestion positively and significantly affects the humanitarian supply chain management performance.

H_0. Port congestion does not affect the humanitarian supply chain management performance.

2.4. Identified Literature gaps

There are several research gaps that have been identified from the studies reviewed so far. There is limited research on humanitarian supply chain especially in disaster relief operations with a specific context of developing countries like Ethiopia. Most researches research has focused on the commercial supply chain even with the context of developed countries. The factors that affect humanitarian supply chain management performances in humanitarian organizations have not been researched in full scale; some of the researches done on the subject matter does not discuss in detail, focusing on the general perspective of how supply chain operation is managed. There also lack of research on how to assess performance aspects of humanitarian supply chain in relation to disaster relief operation; how the performances can be achieved for effective disaster response.

In general, there is a need to deeply study factors that affect the performances of humanitarian supply chain management in relation to disaster relief operation with a specific context on developing countries; since, developing countries does not usually have all the required resources to cope with disasters nor they are able to respond once disaster strikes.

CHAPTER THREE

METHODS OF THE STUDY

Research methods make implicit or explicit assumptions about the nature of the world and of knowledge. They could be instruments for provoking a response from the world. The nature of the respond depends on both the world and the instrument (Mingers, 2001).

To give a better understanding for the reader; the methods that are applied in the research should clearly be explained, the main purpose of this chapter is to explain the research methodology and techniques that used while conducting this study. The chapter provides a brief analysis on the methods of conducting the research; with following topics included; a description of the study area, the research approach, design, population and sample, data source and types, data collection procedures, ethical considerations, and data analysis methods.

3.1. Description of the Study Area

The 2015 – 2016 El-Niño weather phenomenon was one of the most severe of such events in recent decades, affecting nearly 60 million people across the globe and disrupting rainfall patterns causing widespread droughts, floods, and extreme weather in various countries including Ethiopia. Within Ethiopia, the effects began to be felt in early 2015, in the southern and south-eastern parts of the country. These areas experienced below average rainfall, and signs of increased vulnerabilities became evident during this period. In other parts of Ethiopia, flooding caused outbreaks of water-borne disease and the widespread displacement of people and livestock. By August 2015, nearly 4.5 million people required emergency food assistance (Logistics cluster El-Nino drought response report, 2018).

The El Niño drought was followed by extensive flooding that affected 480,000 people, of whom 190,000 were displaced. The severe drought combined with the floods and disease outbreaks, such as Acute Watery Diarrhoea, substantially eroded populations' coping capacities which further increased the level of need. The impact of the crisis on livelihoods, nutritional and health status, and the provision of basic services, was significant. At the peak of the crisis in April 2016, 10.2 million people were targeted with life-saving food assistance, and an additional 7.9 million people benefitted from the Productive Safety Net Programme (PSNP), bringing the total beneficiary population to 18.1 million people (Logistics cluster El-Nino drought response report, 2018).

The study is conducted in the Somali region of Ethiopia. Where there was heavy influx of manmade and natural disasters. The Karen 2016 rainfall was characterized by erratic onset and uneven distribution leading to variations in the performance of crops across different woredas in the region, resulting in the deteriorating body condition in animals significantly and the livestock begun to die in certain area of the region which continued as the long dry season continued in the region added with critical water shortages in the regions affected areas that resulted 1.7million people (31 % of the population) to become food insecure by the December 2016.

The reason for selecting the Somali region for study area is because the region was heavily affected by the El-Nino drought emergency that occurred in 2017. This study will mainly be focusing on identifying the factors that have been affecting the humanitarian relief operation performance in the Somali region and measure the performance of humanitarian organizations supply chain management operations in response to the disaster relief.

3.2. Research Approach

For this research; mixed approach of qualitative and quantitative research approach was applied to show the efforts made in humanitarian supply chain during disaster relief efforts, identify those factors that affect humanitarian supply chain management performance, using the approaches and propose a solution for effectively preparing and responding to disasters; mixed research approach was selected for this research; because the study involves philosophical assumptions. The research is more than simply collecting and analysing both kinds of data; it also involves the use of both approaches in tandem, so that the overall strength of the study is greater.

3.3. Research Design

This study applied a mixed research design; that involved collecting, analysing and integrating quantitative and qualitative data, and it intends to explore, compare, contrast and interpret the existing facts.

For this study explanatory research is used; explanatory research is selected because the study aims to explain deeply the subject under study; which has not been studied extensively with a specific focus on the region; and that the research will add a brief insight in to factors that affect the performance of HSCM with the Somali region disaster relief context.

3.4. Population and Sample

The target population of the study was supply chain experts from8international non-governmental organizations (INGOs) and United Nations (UN) UNICEF, WFP, WHO, IOM, OXFAM, SCI, IRC, and UNHCR that have had a hands-on experience in disaster relief operations and currently operating in the Somali region, and selection of these organization was based on their level operational involvement during the disaster relief operation in supply chain activities that they use high level of supply chain activities from procurement to final delivery while implementing their projects, see table below details by projects involved in.

Table 3. 1 Humanitarian organizations for to be considered in the assessment

Organization	**Involvement by projects**
WFP	Education, Nutrition
UNICEF	Nutrition, Education, Wash, Health
WHO	Health
IOM	ESNFI, Protection
OXFAM	WaSH, Agriculture
SCI	Agriculture, Education, Health, Nutrition, WASH
IRC	Education, ESNFI, Health, Protection, WASH
UNHCR	WaSH, Nutrition, ESNFI

Census method was used to determine sample population using inclusion criteria to get quality data and that the respondents must have the following in order to be included in the census; a) respondents must have a hands on experience in humanitarian disaster response operations, b) respondents must have a clearly defined job description that is related to supply chain, c) respondents must currently be situated at the Somali region offices. An online survey platform was used and was distributed to 8 supply chain experts from each INGO and UN offices in the Somali region; and for interview part 8 heads of supply chain section under each organization were interviewed. Out of the total 64 survey participants 52 competed the survey and 8 heads of supply chain division interviewed.

Please see below table for ease reference.

Table 3. 2Respondent by department

Function	**Respondents per organization**		**Number of respondents**
Procurement	Procurement Officer	Procurement Assistant	2
Transport	Transport officer	Transport Assistant	2
Warehousing	Warehouse Management Officer	Warehouse Management Assistant	2
Contracting	Contacting Management Officer	Contracting Management Assistant	2
	Total respondents = 8 Organizations * 8 Experts = Total Respondents 64 plus 8 interview participants= **Total Population 72**		

3.5. Data Sources and Types

Both primary and secondary data source were used to collect relevant data for the study. The primary source was collected from supply chain experts of INGO and UN organizations using questionnaire and interview; while secondary data will be collected by reviewing both published and unpublished materials and documents gathered from different journals, articles, books, research study, and situation report. To measure supply chain organizations performance a SCOR model was used.

3.6. Data Collection procedures

The study used primary data sources that was gathered using a survey questionnaire. The researcher distributed the questionnaire to respondents of INGO and UN offices. For the purpose of this study a quantitative methodology involving a close-ended questionnaire was used as the measuring instrument. The questionnaire design was in the form of a Likert scale where respondents were required to indicate their views on a scale of 1 to 5 ranging from strongly disagree to strongly agree. The questionnaire was shared through an email of the supply chain experts with a set deadline. A standardized open-ended interview was conducted with eight of supply chain unit heads from each organization's offices in the Somali region.

3.7. Ethical Consideration

Ethics are norms or standards of behaviour that guide moral choices about our behaviour and our relationships with others. The goal of ethics is to ensure that no one is to be harmed or suffer from the adverse consequences from research activities.

The researcher has provided a complete information about the purpose of the study and the researcher's status and role to build trusting relationship with respondents also presented an official letter from Addis Ababa University mentioning the purpose of the study and submitted this letter to each supply chain unit heads. Such action will aid respondents to avoid deception and not to cause harm of any body by any action of the study. The researcher gave due respect for participants and explicitly expressed their right not to take part in the study and disclosing of the need for confidentiality of their response and use of data to be credible.

Researcher maintained objectivity of the study in the process of data collection, during analysis of the collected data and report preparation stages which aided in keeping the balance and avoid bias. In addition, the researcher did not disclose any personal information of the respondents and that was explained during the distribution of the questionnaire. And credit will be given to the authors and organization publications that are to be used in the research.

3.8. Data Analysis

For this study; as the researcher used primary data consisting of both quantitative and qualitative data. In analysing the quantitative data gathered from questionnaires will be examined and validated by checking the answers and numbering them, the study used descriptive statistics using Statistical Package for Social Sciences (SPSS version 26.0). Tabular and graphical data representations were used as needed to present the data findings.

Qualitative data is analysed using content analysis, through developing a thematic framework from the key issues, concepts and themes emanating from the open-ended questions in the questionnaire. Factors that affect humanitarian organizations supply chain performance during disaster relief efforts operations are determined through inferential statistics using correlation analysis.

CHAPTER FOUR

RESULTS, DISCUSSION AND INTERPRETATION

This chapter presents results, discussion and interpretation of the study on the factors affecting the performances of humanitarian organizations in disaster relief operation with a specific focus in the Somali region disaster relief efforts. The study was made based on the following research objectives: to assess factors affecting the performance of humanitarian organizations supply chain management at the Somali region disaster relief operation.

4.1 Results

4.1.1 Response rate

A total of 64 questionnaires were shared using an online survey platform. Out of the shared questionnaires 52 were completed and returned, and this represented a response rate of 81%, and used for analysis. The collected data were presented and analysed using SPSS (version 25) statistical software.

4.1.2 General characteristics of respondents

The study is initially sought to ascertain the general information on the supply Chain professionals involved in the study with regards to gender, age, educational qualification, department, years worked at the organization, years of experience in supply chain management, and type of organization. The general information points at the respondents‟ suitability in answering the questions on factors affecting the performance of humanitarian organizations supply chain in disaster relief operations in the Somali region’’.

4.1.2.1 Gender

Table 3. 3Gender

		Frequency	Percent
Valid	Female	14	26.9
	Male	38	73.1
	Total	52	100.0

As the table above depicts the gender distribution of respondents is 26.9% of females and 73.1 % of males and respectively. This implies the gender distribution in humanitarian organizations is dominated by males.

4.1.2.2 Age

Table 3. 4Age

		Frequency	Percent
Valid	18-25 Years	3	5.8
	26-30 Years	6	11.5
	31-40 Years	28	53.8
	Above 40 Years	15	28.8
	Total	52	100.0

From the findings, 5.8 % of the respondent are on the age range of 18-25 years, 11.5% of the respondent are on the age range of 26-30 years, 53.8% of the respondent are on the age range 31-40 years and the rest 28.8% of the respondent are on the age range of above 40 years.

4.1.2.3 Educational Qualification

		Frequency	Percent
Valid	Grade 12 Completed	3	5.8
	College Diploma	4	7.7
	First Degree	33	63.5
	Second Degree and Above	12	23.1
	Total	52	100.0

Table 3. 5Educational qualification

Finding of the educational qualification shows that 5.8% of the respondents have completed grade 12, 7.7% have college diploma, 63.5% hold first degree, and 23.1% of the respondents hold second degree and above.

4.1.2.4 Department/work unit

		Frequency	Percent
Valid	Procurement	1	1.9
	Transport	20	38.5
	Warehouse	18	34.6
	Contracting	5	9.6
	Other	8	15.4
	Total	52	100.0

Table 3. 6work unit

Respondents unit of work as depicted by the above table shows that, 1.9% are from procurement, 38.5% from Transport section, 34.6% are from warehouse unit, 9.6% contracting section, and other units 15.4%.

4.1.2.5 Years worked at the organization

		Frequency	Percent
Valid	1-5 Years	13	25.0
	6-10 Years	19	36.5
	11-15 Years	18	34.6
	16-20 Years	1	1.9
	Over 20 Years	1	1.9
	Total	52	100.0

Table 3. 7Years worked at the organization

Respondents were also asked to indicate their work experience in the current organization. 25% have 1-5 years of experience, 36.5% have 6-10 years of experience, 34.6% have 11-15 years of experience, 1.9% have 16-20 years of experience and 1.9% have over 20 years of experience.

4.1.2.6 Years of experience working in humanitarian supply chain related task

		Frequency	Percent
Valid	Less than 2 Years	4	7.7
	3-5 Years	12	23.1
	6-10 Years	16	30.8
	Above 10 Years	20	38.5
	Total	52	100.0

Table 3. 8Years of experience

The number of years that an individual has worked in the humanitarian supply chain determines their level of experience in dealing with complex humanitarian relief supply chain operations.7.7% have an experience of less than 2 years, 23.1% have an experience of 3-5 years, 30.8% have an experience of 6-10 years, and 38.5% have and experience of more than 10 years.

4.1.2.7 Type of Organization

		Frequency	Percent
Valid	United Nations Entity	42	80.8
	International NGO	10	19.2
	Total	52	100.0

Table 3. 9Type of organization

Responses were collected from two types of organization; with the intention to have clear cut responses from a variety of organizations. 80.8% of the respondents are from united nations entity, and 19.2% of the respondents from international NGOs.

4.2 Data analysis and interpretation on Humanitarian Organizations Supply Chain Management Practices

The study was conducted with a first objective to determine the humanitarian supply chain management practices at the Somali region, several humanitarian supply chain practices were selected and through preliminary study.

Supply chain professionals of selected organizations were asked to measure humanitarian supply chain practices using five scale Likert scaled responses namely: strongly disagree, disagree, neither agree nor disagree, agree and strongly agree. Below table displays the findings on humanitarian supply chain management practices in disaster relief operations.

Table 4. 1Descriptive data for humanitarian supply chain practices

Humanitarian Organizations Supply Chain Practices		**Mean**	**Std. Deviation**
Fund Sourcing	Sources of fund are mainly in-kind donations.	4.92	0.27
	Sources of fund for disaster relief operations is mainly monetary donation.	3.44	1.27
	Sources of fund for disaster relief operations is mainly government donation.	2.69	1.08
	Funds are made available within the time set for disaster response.	3.85	0.98
	Donation requirements are communicated instantly as per the need identified.	4.04	0.86
	Grand Mean	**3.79**	
Procurement	We apply competitive bidding for procurement of relief supplies in disaster relief operation.	4.21	0.70
	We have the practices of preliminary need assessment in a disaster-prone area before procurement is made	4.00	1.01
	We have the practices of Quantification of the need assessment is made before procurement	4.13	0.77
	We have the practices of Selection of Suppliers and Contract provisions is in practice	4.35	0.59
	We have the practices of Analysis of proposals	4.15	0.89

	We have the practices of Selection of suppliers	4.42	0.54
	We have the practices of Issuance of purchase orders and Administration of purchase contracts and resolution of related problems	4.31	0.88
	We have the practices of Maintenance of a variety of purchase records	4.19	0.89
	Grand Mean	**4.22**	
Transport	We practice identification of the availability of transport services by type of transport	4.31	0.90
	We practice mobilization of transport services with in shortest possible time to respond to disasters	4.25	0.86
	We undertake a survey of available transport service providers,	4.25	0.81
	We practice identification of type of vehicle by means of its capacity,	3.96	0.97
	We practice use of all modes of transport to efficiently support disaster relief operation,	3.90	1.09
	We practice transport capacity planning	4.12	0.90
	We have a practice of transport scheduling	4.08	0.81
	We collaborate with commercial transport companies to improve response capability,	4.17	0.79
	Grand Mean	**4.13**	
Storage and Handling	We practice identification of potential points of storage to enable efficient disaster relief operation,	4.35	0.74
	We practice identification of the required warehouse management equipment for stores,	4.29	0.80
	We have a proper storage practice to efficiently utilize storage space,	4.27	0.95
	We have a proper practice of handing supplies stored,	4.35	0.86
	We practice screening of supplies to identify unwanted materials,	4.19	0.86
	We practice definition of supplies by supply kits for	3.90	0.85

	shipment,		
	We have a practice of discharging supplies as per the need identified,	4.19	0.84
	We practice inventory audit to avoid supply scarcity or surplus,	4.33	0.81
	Grand Mean	**4.23**	
Distribution	We practice definition of distribution points to minimize the distance to beneficiaries.	4.29	0.70
	We design the flow of materials for distribution keeping in mind the people who require it,	4.25	0.74
	We practice distribution of supplies from central distribution centres,	4.02	0.94
	We practice the use of different distribution spots to deliver supplies to the people,	4.15	0.72
	We practice timely distribution of relief supplies	4.15	0.87
	We practice push strategy of distribution where we do not have accurate demand information,	3.54	1.02
	We practice pull strategy of distribution where we do have accurate demand information	3.69	0.90
	Grand Mean	**4.01**	
Information Management	We practice adequacy of information sharing with different actors,	4.19	0.84
	We employ information for proper supply chain planning,	4.23	0.90
	We employ information as a tool for decision making during crisis,	4.19	0.91
	We practice the use of information technology for controlling the efficient cost-effective flow of supplies,	4.33	0.73
	We employ information management to integrate activities of the humanitarian supply chain,	4.33	0.62
	We practice the use of information technology to coordinate with different supply chain actors,	4.13	0.93

	We practice the use of information technology to distribute aid materials,	4.12	0.70
	Grand Mean	**4.22**	
Reverse Logistics	We practice reverse logistics in case of supply of unsolicited goods.	3.63	0.91
	We practice reverse logistics concept in handling rejected supplies.	3.65	0.97
	We practice reverse logistics in handling expired relief supplies,	3.58	1.02
	We practice reverse logistics in handling excessive supply of in-kind donations,	3.62	1.03
	We practice reverse logistics during response phase,	3.31	1.08
	We practice reverse logistics during post disaster phase,	3.44	0.98
	Grand Mean	**3.54**	

From the table above we can understand that out of the seven supply chain practices selected ; 5 have shown to have higher grand mean; which implies that Storage and Handling, Procurement, Information Management, transport and distribution have been found to be the regular practices in disaster relief supply chains ,while the other two fund sourcing and reverse logistics shown less than the other practices; but this doesn't imply that fund sourcing and reverse logistics are less practiced activities in disaster relief operations

Humanitarian supply chain management ranked based on their grand mean are as follows;

Table 4. 2Humanitarian supply chain practices summary

HSCM Practice	Grand Mean
Storage and Handling	4.23
Procurement	4.22
Information Management	4.22
Transport	4.13
Distribution	4.01
Fund sourcing	3.79
Reverse logistics	3.54

Storage and Handling has shown a higher grand mean of 4.23 which implies that storage and handling is the back bone of humanitarian relief supply chain; which respondents shown to have favoured with a strong agreement to the efficient utilization of storage space, implementing proper practice of handling supplies stored, practice screening of supplies to identify unwanted materials, segregation of supplies by kits for shipment process, discharge of supplies as per need identified, and practice inventory audit to avoid scarcity or surplus of supplies; there by aiding the disaster relief operation to enable it with successful operation. According (Ergun,2010) humanitarian organisations have low visibility in the case of the inventory and many times, the control of the inventory is being given to the country officials which may lead to the improper planning like scarcity in some areas and surplus in other.

A preliminary appeal for donations of cash and relief supplies is often made within 36 hours of the onset of a disaster. If donors respond and the appeal is funded, relief supplies are mobilized. The logistician first attempts to procure the supplies from local sources, and if the relief organization owns a centralized warehouse, the logistician then checks available supplies in those warehouses. Anything that cannot be fulfilled locally or from centralized warehouses is procured from global suppliers through competitive bidding. There can be and are usually multiple suppliers supplying a single relief organization for each relief effort (Thomas, 2003).Procurement is ranked to be the second best practiced activity in disaster relief operation with a grand mean of 4.22; implying that efficient procurement practices: application of competitive bidding, conducting preliminary need assessment and quantification, bid analysis, selection of suppliers, issue purchase orders , awarding of contracts , administer purchase contracts, and maintenance of variety of purchase records. With this we can conclude that humanitarian organization in disaster relief operation in the Somali region fully implement procurement practices with greater consent given for an effective disaster relief supply chain operation implementation and by doing so; saving disaster inflicted population.

Power (2005) suggests that a decision support system will help in the better decision making during a crisis. Since no two crisis situations are the same, the decision support systems can be diverse in nature. The coordination between different actors can be information sharing, centralised decision making, conducting joint programmes, regional division of tasks, etc., (Balcik et al., 2010).Information management was found to have scored a grand mean 4.22 in disaster relief operations of humanitarian organizations supply chain management; the mean value show that respondents strongly agree that their organizations practice: adequate information sharing with different actors that enable them run smooth disaster relief operation, use this information shared for

proper supply chain planning, use it a s a tool for supply chain decision making during crisis response, apply it to control the efficient and cost effective flow of supplies, use it to integrate activities of humanitarian supply chain activities for effective relief supplies delivery, to coordinate with different supply chain cooperating partners and use it to distribute aid materials.

Transport practice of humanitarian supply chain management with a grand mean of 4.13 tells us that; respondents show an approval rating to of agreement to different activates involved in disaster relief transport operation; humanitarian organizations during disaster relief operation supply chain management practice: identification of availability transport service as per need, mobilization of transport services with in shortest possible time to immediately respond to disasters, they undertake survey of available transport to efficiently support disaster relief operations, practice the use of all modes of transport to efficiently support disaster relief operation, practice transport capacity planning and scheduling that enables them to properly utilise the available transport resources efficiently, and they collaborate with commercial transport companies to improve response capability in the Somali region disaster response operations. With this practice; humanitarian organizations can operate efficiently to respond to disasters in the Somali region.

Distribution practice has also been significantly practiced in disaster relief operations with a grand mean of 4.01; which makes it one of the main practices in disaster relief supply chain in the Somali region; Humanitarian organizations supply chain professionals has favoured distribution practice with the following activities: as definition of distribution points that will enable them minimize the distance to beneficiaries, flow of materials for distribution while keeping in mind the people who require it, distribution of supplies from central distribution points to be able to distribute supplies on time, practice timely distribution of supplies, and practice of push and pull strategy of distribution depending on availability of demand information; this is in line with the flow of the products is designed keeping in mind the people who require it. The HSCM does not have a manufacturing unit to start with instead only warehouses are available. Moreover, during the disaster, there is a large amount of influx of the donations (Fritz Institute, 2005). These new arrivals are to be sorted out and they must be checked before being given to the people. It is not an uncommon thing to notice that the donations may not always be useful at that time or may have to be stored which again consumes space (Van Wassenhove, 2006).

Needs are assessed in the field and reported back to the organization's headquarters. Management at headquarters then determines a total amount of money they wish to raise from donors to contribute towards the operation. This dollar amount of money is then communicated to donors. Fund sourcing has a grand mean of 3.79; where respondents has highly agreed that sources of fund for disaster relief

are mainly in kind and monetary donations, given their consent that donation requirements are communicated instantly as per the need identified, funds are made available on the time set for disaster response. On the other hand, respondents have disagreed to have fund for disaster relief operations from government donations: this implies that most humanitarian organizations get their fund for disaster relief operations from donors other than government.

Reverse logistics with a grand mean of 3.54; respondents agree to have practices reverse logistics during disaster relief operations; in accordance to this humanitarian organizations have been practicing reverse logistics in case of receiving unsolicited goods, apply the concept to handle rejected and expired supplies, practice the concept in handling of excessive supply of in kind donations, and post disaster phase, but, on the other hand the concept is found to be least practiced during response phase of the disaster relief operation due to the fact that saving lives is of top priority to humanitarian organizations in disaster relief operation. .

4.3 Data analysis and interpretation on Factors affecting Humanitarian Organizations Supply Chain Management

The second objective of the study was to determine the humanitarian supply chain management challenges at the Somali region that directly affect the effective and efficient disaster relief performance of humanitarian organizations. Supply chain professionals of selected organizations were asked to measure humanitarian supply chain challenges using five scale Likert scaled responses namely: strongly disagree, disagree, neither agree nor disagree, agree and strongly agree.

The table below depicts the findings of the study on supply chain challenges both internal and external.

Table 4. 3Descriptive data for internal factors affecting humanitarian supply chain performance

Internal Factors Affecting Humanitarian Organizations Supply Chain		**Mean**	**Std. Deviation**
Human resources	Lack of professionals to deploy for relief operation with the required training, preparedness to effectively operate in the area negatively affects humanitarian supply chain management performance.	4.29	0.89
	Unavailability of organized disaster response team in place negatively affects the humanitarian supply chain management performance.	4.29	0.78
	Unavailability of human resource with adequate knowledge of disaster relief operation negatively affects humanitarian supply chain management performance.	4.19	0.89

	Unavailability of professional with the required skill negatively affects humanitarian supply chain management performance.	4.35	0.74
	Grand Mean	**4.28**	
Funding Bias	Inadequate funds availability for disaster relief negatively efforts affects humanitarian supply chain management performance.	4.29	0.80
	There is tight donor scrutiny that negatively affects the humanitarian supply chain management performance.	3.88	0.98
	Funding partner unavailability negatively affects the humanitarian supply chain management performance	4.33	0.68
	Delayed funding negatively affects the humanitarian supply chain management performance.	4.37	0.63
	Donors being highly valued customers in the eye of the organization as compared to beneficiaries negatively affects humanitarian supply chain performance.	4.04	0.86
	Grand Mean	**4.18**	
Information Technology	Unavailability of funds for necessary information technology adoption negatively affects the humanitarian supply chain management performance.	4.27	0.66
	Limited investment in information technology negatively affects the humanitarian supply chain management performance.	4.27	0.74
	Unavailability of information technology expects negatively affects the humanitarian supply chain management performance.	4.23	0.90
	Lack of advanced information technology tools during disaster response negatively affects the humanitarian supply chain management performance.	4.25	0.76
	Grand Mean	**4.25**	
Supply Chain coordination and Management	Lack of coordination among humanitarian supply chain actors negatively affects the humanitarian supply chain management performance.	4.38	0.75
	Unavailability of people specialized in the coordination aspects affects humanitarian supply chain management performance.	4.31	0.73
	Presence of specific policies related to humanitarian actor coordination in the region delay the response capability of the organization	4.17	0.86
	Unavailability of virtual integration system to build supply chain integration negatively affects the humanitarian supply chain management performance.	4.21	0.85
	Grand Mean	**4.27**	
Knowledge Gap	Lack of debriefings for supply chain experts following relief operation deployment negatively affects humanitarian supply chain management performance.	4.27	0.74

	Unavailability of lessons learned reports from previous disaster management event negatively affects the humanitarian supply chain management performance.	4.35	0.62
	High turnover rate added with lack of career advancement among field supply chain experts negatively affects the humanitarian supply chain management performance.	4.29	0.67
	Grand Mean	**4.30**	
External Factors Affecting Humanitarian Organizations Supply Chain		**Mean**	**Std. Deviation**
Demand Uncertainty	Demand uncertainty negatively affects the humanitarian supply chain management performance.	4.31	0.64
	Uncertainty on the number of beneficiaries negatively affects humanitarian supply chain management performance.	4.29	0.78
	Uncertainty on the types of relief items required by beneficiaries negatively affects the humanitarian supply chain management performance.	4.38	0.77
	Grand Mean	**4.33**	
Degraded infrastructure	Poor infrastructure for relief supplies negatively affects the humanitarian supply chain management performance.	4.52	0.54
	Degraded transport infrastructure (road infrastructure) negatively affects the humanitarian supply chain management performance.	4.48	0.67
	Unavailability of communication infrastructure with disaster prone area negatively affects the humanitarian supply chain management performance.	4.48	0.61
	Grand Mean	**4.49**	
Transport availability	Post disaster transportation unavailability negatively affects the humanitarian supply chain management performance	4.42	0.61
	Limited availability of transport means after disaster strikes negatively affects humanitarian supply chain management performance.	4.48	0.58
	Unavailability of own humanitarian vehicle fleets affects humanitarian supply chain management performance.	4.37	0.63
	Inflation of cost of transportation in the disaster-prone area negatively affects the humanitarian supply chain management performance.	4.42	0.57
	Grand Mean	**4.42**	
Security Issues	Lack of regular security assessments negatively affects humanitarian supply chain management performance.	4.48	0.61
	Special regulations imposed by government to access some routes and airfields for transportation of relief supplies negatively affects the humanitarian supply	4.12	0.83

	chain management performance.		
	Conflict among different groups (internal conflict) negatively affects the humanitarian supply chain management performance.	4.54	0.61
	Regulations on clearance and work permits for humanitarian supply chain experts negatively affects the humanitarian supply chain management performance.	4.08	0.84
	Lack of strong operational security for humanitarian workers operating in insecure environments negatively affects the humanitarian supply chain management performance.	4.35	0.59
	Grand Mean	**4.31**	
Port Congestion	Congestion at ports negatively affects the humanitarian supply chain management performance.	4.25	0.62
	Having limited entry ports negatively affects the humanitarian supply chain management performance.	4.38	0.60
	Lengthy lead time resulting from port congestion negatively affects the humanitarian supply chain management performance.	4.29	0.57
	Delay in delivery of relief supplies that is resulting from port congestion negatively affects the humanitarian supply chain management performance.	4.33	0.68
	Grand Mean	**4.31**	

As the table above illustrates, both internal and external factors that affect the effective performance of humanitarian supply chain in disaster relief efforts are found to be significant; of which have a direct impact on disaster relief operation in the region. Below table shows the summary of challenge variable ranked according to their impact on performance.

Table 4. 4Summary factors affecting humanitarian supply chain performance (Internal and external)

Rank	**Internal factors affecting HSCM**	**Grand Mean**
1	Knowledge Gap	4.30
2	Human resource	4.28
3	Supply Chain Coordination and Management	4.27
4	Information Technology	4.25
5	Funding Bias	4.18
	External factors affecting HSCM	**Grand Mean**
1	Degraded infrastructure	4.49
2	Transport availability	4.42
3	Demand Uncertainty	4.33
4	Port congestion	4.31
5	Security Issues	4.31

When comparing internal and external factors; it is found that external factors with an overall grand mean of 4.37 have high impact as compared to internal factors with an overall grand mean of 4.26.

4.3.1. Internal Factors affecting Humanitarian Organizations Supply Chain Management performance

From internal factors that affect humanitarian supply chain management performance in disaster relief operations: respondents have given high agreement to knowledge gap in disaster relief operations with a grand mean of 4.30:which implies that humanitarian supply chain performance in disaster relief suffers from lack of debriefings for supply chain experts following relief operation deployment, unavailability of lessons learned reports from previous disaster management events, high turnover rate added with lack of career advancement among field supply chain experts; Poor or non-existent training ultimately affects the quality of any disaster response operation. Many field workers partaking in their first relief operation never sign up for a second; one in three field workers quits because of burnout (Gustavsson, 2003). Thus, the expertise of these agencies generally rests within a small group of highly experienced humanitarian field workers, which makes the development of explicit knowledge and expertise, as well as institutional learning, particularly problematic.

The other factor that affects humanitarian supply chain performance is human resource with a grand mean of 4.28; with this respondents implied to have faced challenges of: Lack of professionals to deploy for relief operation with the required training, preparedness to effectively operate in the area, unavailability of organized disaster response team in place, unavailability of human resource with adequate knowledge of disaster relief operation, and unavailability of professional with the required skill.

Supply chain coordination and management is the other factor that affects humanitarian supply chain performance with a grand mean of 4.27; this implies that humanitarian supply chain performance is affected by lack of coordination among humanitarian supply chain actors, unavailability of people specialized in the coordination aspects, presence of specific policies related to humanitarian actor coordination in the region delay the response capability of the organizations, and unavailability of virtual integration system to build supply chain integration.

Information technology being the fourth factor that affects the humanitarian supply chain performance with a grand mean of 4.25 show that respondents have shown a strong agreement to challenges in relation to the following information technology factors: humanitarian supply chain performance is affected due to unavailability of funds for necessary information technology adoption, limited investment in information technology, unavailability of information technology experts and lack of

advanced information technology tools during disaster response are said to have negatively affected humanitarian supply chain performance in disaster relief operation of Somali region. Majority of the humanitarian organizations have invested very little capital in the development and implementation of modern management information systems, information technology or logistics systems. Further Thomas (2003).

The last internal factor that is said to have negatively affected humanitarian supply chain management is funding bias with a grand mean of 4.18: which implies humanitarian supply chain professionals face: challenges with regard to inadequacy of funds availability for disaster relief, tight donor scrutiny, funding partner unavailability, delayed funding , donors being highly valued customers in the eye of the organization as compared to beneficiaries has been found to have been negatively affecting humanitarian supply chain management in disaster relief operation in the Somali region disaster relief efforts. Donations, which provide the main funding for relief efforts, often increase immediately after a disaster occurs (Ratliff, 2007). However, for the funded relief to be supplied, a financial supply chain must exist, which often creates a problem, because agencies struggle if their money transfer processes are inadequate or they lack formal arrangements with local financial institutions and suppliers (Russel, 2005).

4.3.2. External factors affecting Humanitarian Organizations Supply Chain Management performance

From external factor that affect humanitarian supply chain performance; degraded infrastructure has been taken the greater challenge in disaster relief operation with a grand mean of 4.49, this implies that poor infrastructure like; degraded transport infrastructure (road infrastructure), unavailability of communication infrastructure with in the disaster prone area negatively affects the humanitarian supply chain management performance and this in turn affects the effective disaster response capability of humanitarian organizations in disaster relief operation. Poor transportation and communications infrastructure are other barriers to effective delivery of aid. Rapid onset of a disaster may degrade the country's existing infrastructure to the point where delivery of aid is severely hampered. "Often transportation infrastructure is in poor condition and cannot handle the huge numbers of refugees, military vehicles, and relief shipments that pour into these areas in times of disaster. (Gooley, 1999)

Transportation is a major component of disaster relief operations. Post disaster transportation, especially across the last mile can be particularly challenging for relief agencies. This challenge arises from damaged infrastructure, limited transportation resources, and the sheer amounts and bulk of supplies to be transported (Balcik et al., 2008).Regarding transport availability to move disaster relief

supplies to disaster prone areashas shown to be greater challenge with a grand mean of 4.42: which indicates that respondents believe that factors like; post disaster transportation unavailability, limited availability of transport means after disaster strikes, unavailability of own humanitarian vehicle fleets, inflation of cost of transportation in the disaster-prone area negatively affects the humanitarian supply chain management performance.

Demand uncertainty in disaster relief operation is a major challenge, since with no demand information; humanitarian organisations will not be able to deliver the required assistance with the required quantity and this creates a challenge to a goal of effective relief supplies delivery; respondents have measured demand uncertainty to be a major challenge with a grand mean of 4.33: agreeing to the factors like: uncertainty over demand information of disaster inflicted population, uncertainty on the number of beneficiaries , uncertainty on the types of relief items required by beneficiaries negatively affects the humanitarian supply chain management performance.

Congestion at port is also another major challenge that hampers the effective disaster relief operation and causing delays, respondents have demonstrated a strong agreement to the challenges in relation to port congestion with a grand mean of 4.31: indicating that congestion at ports negatively affects the humanitarian supply chain management performance in different perspectives from delays to expired commodities at port, limited entry ports is another challenge that negatively affects the humanitarian supply chain management performance, added to this; lengthy lead time and delay in delivery of relief supplies that results from port congestion, all these and other negatively affect the effective and efficient delivery of relief supplies there by causing a problem to live saving goal of humanitarian organization. According to Gidado (2015), congestion in any ports is usually attached to delays, queuing and extra time of voyage and dwell of ships and cargo at the port affecting the entire logistics and supply chain system. This results in lengthy lead time and extra costs to all stakeholders such as transport service providers and traders in the supply chain.

The last external factor affecting the performance of humanitarian supply chain management is security issues caused by public unrest, road blockage, conflict and other government regulations that hamper the free movement of disaster relief supplies. Security issue has been rated to have a grand mean of 4.31 of which respondents shown to have strongly agree the challenges related to security problems like: lack of regular security assessments by humanitarian partners, special regulations imposed by government to access some routes and air fields for transportation of relief supplies, conflict among different groups (internal conflict), special regulations on clearance and work permits for humanitarian supply chain experts, lack of strong operational security for humanitarian aid workers operating in insecure environments negatively affects the humanitarian supply chain

management performance. According to Walton, et al., (2011), despite humanitarian workers efforts to strengthen operational security in insecure environments, attacks that have led to death, kidnapping or serious injury, continue to exact a heavy toll on humanitarian personnel preventing the wounded and sick from receiving the care and protection they require.

4.4. Inferential statistics factors affecting Humanitarian Organizations Supply Chain Management performance

4.4.1. Rank order analysis of factors affecting Humanitarian Organizations Supply Chain Management performance (Kendall's. Wallis Coefficient of concordance of rank order analysis model)

To be able to analyse the concordance among respondents and rank the factors affecting the performance of humanitarian organizations supply chain management in disaster relief operations the Kendall's. Wallis coefficient of concordance of the rank order analysis model was used to determine the challenges of the relief operation.

On the assumption that the value of Kendall's W is always between 0 and 1 given W=0 means perfect disagreement and W = 1 perfect agreement

Therefore, the findings show there are agreement or concordance W=0.049 among the respondents with P<001 on the factors affecting performance of humanitarian supply chain management in disaster relief operation in the Somali region.

Table 4. 5 Rank order analysis model

Item N=52	**Mean Rank**	**Rank**
There is tight donor scrutiny that negatively affects the humanitarian supply chain management performance.	15.60	1
Donors being highly valued customers in the eye of the organization as compared to beneficiaries negatively affects humanitarian supply chain performance.	16.71	2
Special regulations imposed by government to access some routes and airfields for transportation of relief supplies negatively affects the humanitarian supply chain management performance.	17.67	3
Regulations on clearance and work permits for humanitarian supply chain experts negatively affects the humanitarian supply chain management performance.	18.10	4
Presence of specific policies related to humanitarian actor coordination in the region delay the response capability of the organization	18.88	5
Congestion at ports negatively affects the humanitarian supply chain management performance.	19.22	6
Lack of advanced information technology tools during disaster response negatively affects the humanitarian supply chain management performance.	19.25	7
Unavailability of virtual integration system to build supply chain integration negatively affects the humanitarian supply chain management performance.	19.35	8

Unavailability of human resource with adequate knowledge of disaster relief operation negatively affects humanitarian supply chain management performance.	19.44	9
Unavailability of funds for necessary information technology adoption negatively affects the humanitarian supply chain management performance.	19.44	9
Limited investment in information technology negatively affects the humanitarian supply chain management performance.	19.49	11
Lengthy lead time resulting from port congestion negatively affects the humanitarian supply chain management performance.	19.50	12
Lack of debriefings for supply chain experts following relief operation deployment negatively affects humanitarian supply chain management performance.	19.61	13
Unavailability of information technology expects negatively affects the humanitarian supply chain management performance.	19.82	14
High turnover rate added with lack of career advancement among field supply chain experts negatively affects the humanitarian supply chain management performance.	19.88	15
Demand uncertainty negatively affects the humanitarian supply chain management performance.	19.94	16
Uncertainty on the number of beneficiaries negatively affects humanitarian supply chain management performance.	20.08	17
Unavailability of own humanitarian vehicle fleets affects humanitarian supply chain management performance.	20.34	18
Funding partner unavailability negatively affects the humanitarian supply chain management performance	20.36	19
Unavailability of people specialized in the coordination aspects affects humanitarian supply chain management performance.	20.37	20
Unavailability of lessons learned reports from previous disaster management event negatively affects the humanitarian supply chain management performance.	20.45	21
Lack of strong operational security for humanitarian workers operating in insecure environments negatively affects the humanitarian supply chain management performance.	20.47	22
Delay in delivery of relief supplies that is resulting from port congestion negatively affects the humanitarian supply chain management performance.	20.59	23
Inadequate funds availability for disaster relief negatively efforts affects humanitarian supply chain management performance.	20.61	24
Unavailability of organized disaster response team in place negatively affects the humanitarian supply chain management performance.	20.63	25
Unavailability of professional with the required skill negatively affects humanitarian supply chain management performance.	20.91	26
Having limited entry ports negatively affects the humanitarian supply chain management performance.	21.07	27
Lack of professionals to deploy for relief operation with the required training, preparedness to effectively operate in the area negatively affects humanitarian supply chain management performance.	21.18	28
Delayed funding negatively affects the humanitarian supply chain management performance.	21.24	29
Uncertainty on the types of relief items required by beneficiaries negatively affects the humanitarian supply chain management performance.	21.58	30
Inflation of cost of transportation in the disaster-prone area negatively affects the humanitarian supply chain management performance.	21.81	31
Lack of coordination among humanitarian supply chain actors negatively affects the humanitarian supply chain management performance.	21.85	32
Post disaster transportation unavailability negatively affects the humanitarian supply chain management performance	22.13	33
Lack of regular security assessments negatively affects humanitarian supply chain management performance.	22.66	34

Unavailability of communication infrastructure with disaster prone area negatively affects the humanitarian supply chain management performance.	22.99	35
Degraded transport infrastructure (road infrastructure) negatively affects the humanitarian supply chain management performance.	23.02	36
Limited availability of transport means after disaster strikes negatively affects humanitarian supply chain management performance.	23.06	37
Poor infrastructure for relief supplies negatively affects the humanitarian supply chain management performance.	23.27	38
Conflict among different groups (internal conflict) negatively affects the humanitarian supply chain management performance.	23.62	39
Conflict among different groups (internal conflict) negatively affects the humanitarian supply chain management performance.	23.85	40
N=52 **Kendall's Wa. = 0.049** **Chi-Square = 98.564** **Df = 39** **Asymp. Sig. = .000** **a Kendall's Coefficient of Concordance**		

From the table above we can see the top five challenges ranked are: first) tight donor scrutiny with a ranked mean value of 15.60, second) donors being highly valued customers in the eye of the organization as compared to beneficiaries with a ranked mean values of 16.71, third) special regulations imposed by government to access some routes and airfields for transportation of relief supplies with a ranked mean of 17.67, fourth) regulations on clearance and work permits for humanitarian supply chain experts with a ranked mean of 18.10 , fifth) presence of specific policies related to humanitarian actor coordination in the region delay the response capability of the organization ranked with a mean of 18.88.

4.4 Correlation Analysis on factors affecting the performance of HSCM

Correlations are the degree of association of two or more variables. The researcher examined the associations among all variables used in the study using correlation analysis whose results are presented in tables below.

H_1. Human resources positively and significantly affect the humanitarian supply chain management performance.

H_0. Human resources do not affect the humanitarian supply chain management performance.

Human resource challenge Correlations		HR1	HR2	HR3	HR4
Lack of professionals to deploy for relief operation with the required training, preparedness to effectively operate in the area negatively affects humanitarian supply chain management performance (HR1).	Pearson Correlation	1	.670**	.523**	.708**
	Sig. (2-tailed)		0.000	0.000	0.000
	N	52	52	52	52
Unavailability of organized disaster response team in place negatively affects the humanitarian supply chain management performance (HR2).	Pearson Correlation	.670**	1	.602**	.679**
	Sig. (2-tailed)	0.000		0.000	0.000
	N	52	52	52	52
Unavailability of human resource with adequate knowledge of disaster relief operation negatively affects humanitarian supply chain management performance (HR3).	Pearson Correlation	.523**	.602**	1	.706**
	Sig. (2-tailed)	0.000	0.000		0.000
	N	52	52	52	52
Unavailability of professional with the required skill negatively affects humanitarian supply chain management performance (HR4).	Pearson Correlation	.708**	.679**	.706**	1
	Sig. (2-tailed)	0.000	0.000	0.000	
	N	52	52	52	52
**. Correlation is significant at the 0.01 level (2-tailed).					

Pearson's coefficient of correlation was conducted to examine the relationship between human resources and humanitarian supply chain performance, it is found that the relationship between human resource and humanitarian supply chain management performance is significant at P<0.01 level. This indicates that human resources positively and significantly affect humanitarian supply chain management performance.

H_2. Funding bias positively and significantly affects the humanitarian supply chain management performance.

H_0. Funding bias does not affect the humanitarian supply chain management performance.

Funding Biased Challenge Correlations		F1	F2	F3	F4	F5
Inadequate funds availability for disaster relief negatively efforts affects humanitarian supply chain management performance (F1)	Pearson Correlation	1	.392**	.690**	.372**	0.211
	Sig. (2-tailed)		0.004	0.000	0.007	0.133
	N	52	52	52	52	52
There is tight donor scrutiny that negatively affects the humanitarian supply chain management performance. (F2)	Pearson Correlation	.392**	1	.440**	.356**	.491**
	Sig. (2-tailed)	0.004		0.001	0.010	0.000
	N	52	52	52	52	52
Funding partner unavailability negatively affects the humanitarian supply chain management performance (F3)	Pearson Correlation	.690**	.440**	1	.590**	.414**
	Sig. (2-tailed)	0.000	0.001		0.000	0.002
	N	52	52	52	52	52
Delayed funding negatively affects the humanitarian supply chain management performance (F4)	Pearson Correlation	.372**	.356**	.590**	1	.409**

	Sig. (2-tailed)	0.007	0.010	0.000		0.003
	N	52	52	52	52	52
Donors being highly valued customers in the eye of the organization as compared to beneficiaries negatively affects humanitarian supply chain performance (F5)	Pearson Correlation	0.211	.491**	.414**	.409**	1
	Sig. (2-tailed)	0.133	0.000	0.002	0.003	
	N	52	52	52	52	52
**. Correlation is significant at the 0.01 level (2-tailed).						

Pearson's coefficient of correlation was conducted to examine the relationship between funding bias and humanitarian supply chain performance, it is found that the relationship between human resource and humanitarian supply chain management performance is significant at P<0.01 level. This indicates that funding bias positively and significantly affects humanitarian supply chain management performance.

H_3. Information technology positively and significantly affects the humanitarian supply chain management performance.

H_0. Information technology does not affect the humanitarian supply chain management performance.

Information Technology Factors correlations		IT1	IT2	IT3	IT4
Unavailability of funds for necessary information technology adoption negatively affects the humanitarian supply chain management performance. (IT1)	Pearson Correlation	1	.728**	.620**	.603**
	Sig. (2-tailed)		0.000	0.000	0.000
	N	52	52	52	52
Limited investment in information technology negatively affects the humanitarian supply chain management performance (IT2)	Pearson Correlation	.728**	1	.755**	.673**
	Sig. (2-tailed)	0.000		0.000	0.000
	N	52	52	52	52
Unavailability of information technology expects negatively affects the humanitarian supply chain management performance. (IT3)	Pearson Correlation	.620**	.755**	1	.628**
	Sig. (2-tailed)	0.000	0.000		0.000
	N	52	52	52	52
Lack of advanced information technology tools during disaster response negatively affects the humanitarian supply chain management performance. (IT4)	Pearson Correlation	.603**	.673**	.628**	1
	Sig. (2-tailed)	0.000	0.000	0.000	
	N	52	52	52	52
**. Correlation is significant at the 0.01 level (2-tailed).					

As the table above depicts; The relationship between information technology and humanitarian supply chain performance is significant at P<0.01 level. This indicates that information technology positively and significantly affects humanitarian supply chain management performance.

H_4. Supply chain coordination and management positively and significantly affects the humanitarian supply chain management performance.

H_0. Supply chain coordination and management does not affect the humanitarian supply chain management performance.

Supply Chain Coordination Factors Correlations		SCC1	SCC2	SCC3	SCC4
Lack of coordination among humanitarian supply chain actors negatively affects the humanitarian supply chain management performance (SCC1)	Pearson Correlation	1	.789**	.416**	.769**
	Sig. (2-tailed)		0.000	0.002	0.000
	N	52	52	52	52
Unavailability of people specialized in the coordination aspects affects humanitarian supply chain management performance (SCC2).	Pearson Correlation	.789**	1	.290*	.622**
	Sig. (2-tailed)	0.000		0.037	0.000
	N	52	52	52	52
Presence of specific policies related to humanitarian actor coordination in the region delay the response capability of the organization (SCC3)	Pearson Correlation	.416**	.290*	1	.515**
	Sig. (2-tailed)	0.002	0.037		0.000
	N	52	52	52	52
Unavailability of virtual integration system to build supply chain integration negatively affects the humanitarian supply chain management performance (SCC4).	Pearson Correlation	.769**	.622**	.515**	1
	Sig. (2-tailed)	0.000	0.000	0.000	
	N	52	52	52	52
**. Correlation is significant at the 0.01 level (2-tailed).					
*. Correlation is significant at the 0.05 level (2-tailed).					

Pearson's coefficient of correlation was conducted to examine the relationship between supply chain coordination and humanitarian supply chain performance, which is found to be significant at $P<0.01$ level. This indicates that information technology positively and significantly affects humanitarian supply chain management performance.

H_5. Knowledge gap positively and significantly affects the humanitarian supply chain management performance.

H_0. Knowledge gap does not affect the humanitarian supply chain management performance.

Knowledge Gap Factors Correlation		KG1	KG2	KG3
Lack of debriefings for supply chain experts following relief operation deployment negatively affects humanitarian supply chain management performance (KG1)	Pearson Correlation	1	.811**	.354**
	Sig. (2-tailed)		0.000	0.010
	N	52	52	52
Unavailability of lessons learned reports from previous disaster management event negatively affects the humanitarian supply chain management performance (KG2)	Pearson Correlation	.811**	1	.416**
	Sig. (2-tailed)	0.000		0.002
	N	52	52	52
High turnover rate added with lack of career advancement among field supply chain experts negatively affects the humanitarian supply chain management performance (KG3)	Pearson Correlation	.354**	.416**	1
	Sig. (2-tailed)	0.010	0.002	
	N	52	52	52
**. Correlation is significant at the 0.01 level (2-tailed).				

The relationship between knowledge gap and humanitarian supply chain performance was also found to be significant, which implies that knowledge gap positively and significantly affects the humanitarian supply chain management performance

H_6. Demand uncertainty positively and significantly affects the humanitarian supply chain management performance,

H_0. Demand uncertainty does not affect the humanitarian supply chain management performance.

Demand Uncertainty factors Correlations		Du1	DU2	DU3
Demand uncertainty negatively affects the humanitarian supply chain management performance. (DU1)	Pearson Correlation	1	.762**	.706**
	Sig. (2-tailed)		0.000	0.000
	N	52	52	52
Uncertainty on the number of beneficiaries negatively affects humanitarian supply chain management performance (DU2)	Pearson Correlation	.762**	1	.729**
	Sig. (2-tailed)	0.000		0.000
	N	52	52	52
Uncertainty on the types of relief items required by beneficiaries negatively affects the humanitarian supply chain management performance. (DU3)	Pearson Correlation	.706**	.729**	1
	Sig. (2-tailed)	0.000	0.000	
	N	52	52	52
**. Correlation is significant at the 0.01 level (2-tailed).				

The relationship between demand uncertainty and humanitarian supply chain performance is significant at P<0.01 level. This indicates that demand uncertainty positively and significantly affects humanitarian supply chain management performance.

H_7. Degraded infrastructure positively and significantly affects the humanitarian supply chain management performance.

H_0. Degraded infrastructure does not affect the humanitarian supply chain management performance.

Degraded infrastructure Factors Correlations		DI1	DI2	DI3
Poor infrastructure for relief supplies negatively affects the humanitarian supply chain management performance (DI1)	Pearson Correlation	1	.702**	.476**
	Sig. (2-tailed)		0.000	0.000
	N	52	52	52
Degraded transport infrastructure (road infrastructure) negatively affects the humanitarian supply chain management performance (DI2)	Pearson Correlation	.702**	1	.717**
	Sig. (2-tailed)	0.000		0.000
	N	52	52	52
Unavailability of communication infrastructure with disaster prone area negatively affects the humanitarian supply chain management performance. (DI3)	Pearson Correlation	.476**	.717**	1
	Sig. (2-tailed)	0.000	0.000	
	N	52	52	52
**. Correlation is significant at the 0.01 level (2-tailed).				

The relationship between degraded infrastructure and humanitarian supply chain management performance is significant at P<0.01 level. This indicates that demand uncertainty positively and significantly affects humanitarian supply chain management performance.

H_8. Transportation availability positively and significantly affects the humanitarian supply chain management performance.

H_0. Transportation availability does not affect the humanitarian supply chain management performance.

Transport availability factors correlation		TA1	TA2	TA3	TA4
Post disaster transportation unavailability negatively affects the humanitarian supply chain management performance (TA1)	Pearson Correlation	1	.473**	0.256	.322*
	Sig. (2-tailed)		0.000	0.067	0.020
	N	52	52	52	52
Limited availability of transport means after disaster strikes negatively affects humanitarian supply chain management performance (TA2)	Pearson Correlation	.473**	1	0.264	.382**
	Sig. (2-tailed)	0.000		0.059	0.005
	N	52	52	52	52
Unavailability of own humanitarian vehicle fleets affects humanitarian supply chain management performance. (TA3)	Pearson Correlation	0.256	0.264	1	.435**
	Sig. (2-tailed)	0.067	0.059		0.001
	N	52	52	52	52
Inflation of cost of transportation in the disaster-prone area negatively affects the humanitarian supply chain management performance (TA4)	Pearson Correlation	.322*	.382**	.435**	1
	Sig. (2-tailed)	0.020	0.005	0.001	
	N	52	52	52	52
**. Correlation is significant at the 0.01 level (2-tailed).					
*. Correlation is significant at the 0.05 level (2-tailed).					

The relationship between transport availability and humanitarian supply chain performance is significant at P<0.01 and P< 0.05 level. This indicates that transport availability positively and significantly affects humanitarian supply chain management performance.

H_9. Security issue positively and significantly affects the humanitarian supply chain management performance.

H_0. Security issue does not affect the humanitarian supply chain management performance.

Security Factors correlations		S1	S2	S3	S4	S5
Lack of regular security assessments negatively affects humanitarian supply chain management performance(S1)	Pearson Correlation	1	.391**	.345*	0.118	.509**
	Sig. (2-tailed)		0.004	0.012	0.404	0.000
	N	52	52	52	52	52
Special regulations imposed by government to access some routes and airfields for transportation of relief supplies negatively affects the humanitarian supply chain management performance (S2)	Pearson Correlation	.391**	1	.455**	.297*	.476**
	Sig. (2-tailed)	0.004		0.001	0.033	0.000
	N	52	52	52	52	52
Conflict among different groups (internal conflict) negatively affects the humanitarian supply chain management performance(S3)	Pearson Correlation	.345*	.455**	1	0.148	.399**
	Sig. (2-tailed)	0.012	0.001		0.295	0.003
	N	52	52	52	52	52
Regulations on clearance and work permits for humanitarian supply chain experts negatively affects the humanitarian supply chain management performance (S4)	Pearson Correlation	0.118	.297*	0.148	1	0.183
	Sig. (2-tailed)	0.404	0.033	0.295		0.193
	N	52	52	52	52	52
Lack of strong operational security for humanitarian workers operating in insecure environments negatively affects the humanitarian supply chain management performance (S5)	Pearson Correlation	.509**	.476**	.399**	0.183	1
	Sig. (2-tailed)	0.000	0.000	0.003	0.193	
	N	52	52	52	52	52
**. Correlation is significant at the 0.01 level (2-tailed).						
*. Correlation is significant at the 0.05 level (2-tailed).						

The relationship between security issue and humanitarian supply chain performance is significant at P<0.01 and P< 0.05 level. This indicates that security issue positively and significantly affects humanitarian supply chain management performance.

H_{10}. Port congestion positively and significantly affects the humanitarian supply chain management performance.

H_0. Port congestion does not affect the humanitarian supply chain management performance.

Port Congestion factors correlation		P1	P2	P3	P4	P5
Conflict among different groups (internal conflict) negatively affects the humanitarian supply chain management performance (P1)	Pearson Correlation	1	0.173	.381**	.317*	0.203
	Sig. (2-tailed)		0.221	0.005	0.022	0.149
	N	52	52	52	52	52
Congestion at ports negatively affects the humanitarian supply chain management performance (P2)	Pearson Correlation	0.173	1	.526**	.620**	.546**
	Sig. (2-tailed)	0.221		0.000	0.000	0.000
	N	52	52	52	52	52
Having limited entry ports negatively affects the humanitarian supply chain management performance (P3)	Pearson Correlation	.381**	.526**	1	.872**	.602**
	Sig. (2-tailed)	0.005	0.000		0.000	0.000
	N	52	52	52	52	52
Lengthy lead time resulting from port congestion negatively affects the humanitarian supply chain management performance (P4).	Pearson Correlation	.317*	.620**	.872**	1	.764**
	Sig. (2-tailed)	0.022	0.000	0.000		0.000
	N	52	52	52	52	52
Delay in delivery of relief supplies that is resulting from port congestion negatively affects the humanitarian supply chain management performance (P5)	Pearson Correlation	0.203	.546**	.602**	.764**	1
	Sig. (2-tailed)	0.149	0.000	0.000	0.000	
	N	52	52	52	52	52
**. Correlation is significant at the 0.01 level (2-tailed).						
*. Correlation is significant at the 0.05 level (2-tailed).						

The relationship between port congestion and humanitarian supply chain performance is significant at P<0.01 and P< 0.05 level. This indicates that port congestion positively and significantly affects humanitarian supply chain management performance.

4.5 Data analysis and interpretation on Humanitarian Organizations Supply Chain Management Performance

The third objective of the study was to assess the humanitarian supply chain management performance at the Somali region; achieving a greater performance in humanitarian supply chain operation implied providing reliable, timely and agile supply chain operation while serving the disaster inflicted people, supply chain professionals of selected organizations were asked to measure humanitarian supply chain performance using five scale Likert scaled responses namely: strongly disagree, disagree, neither agree nor disagree, agree and strongly agree.

Table 4. 6descriptive data for humanitarian supply chain performance dimensions

Humanitarian Supply Chain Management Performance Dimensions		**Mean**	**Std. Deviation**
Reliability statement	My organization provides the right quantity of relief items to beneficiary	4.19	0.72
	My organization exhibited strong ability to perform tasks as expected	4.37	0.63
	My organization provides right packaging for relief item and deliver with right condition	4.35	0.59
	My organization provides relief item of high quality to beneficiaries	4.17	0.71
	My organization conducts need assessment accurately in disaster prone areas,	4.10	0.72
	Grand Mean	**4.23**	
Responsiveness statement	My organization provides relief item as per their schedule	4.12	0.78
	My organization has standard time, speed at which humanitarian supply chain tasks should be performed	4.21	0.67
	My organization provides relief item on time after their requisition	4.17	0.68
	My organization provides relief within 72 hours of disaster strike	3.69	0.96
	My organization exhibits responsiveness to donation-to-delivery time to provide humanitarian logistics	4.13	0.63
	My organization exhibits minimum order fulfilment cycle time to provide humanitarian logistics	4.17	0.62
	Grand Mean	**4.08**	
Agility statement	My organization adapt quickly to a system of stock managing when there is stock out	4.19	0.63
	My organization adapt quickly to a system of stock managing when additional demand is required	4.17	0.68

	My organization monitors the overall relief supply chain and responds immediately to minimize supply chain risk	4.23	0.70
	Grand Mean	**4.20**	

As the table above depicts, the three performance indicators indicate high grand mean that implies all performance indicators are of high significance to humanitarian supply chain disaster relief operation. Reliability statement of performance dimension is the highest with a grand mean of 4.23, while agility statement scores with a second highest score of 4.20 grand mean; and the third performance indicator responsiveness statement with a grand mean of 4.08.

Table 4. 7Summary of humanitarian supply chain performance dimensions

Performance dimension	Grand Mean
Reliability statement	4.23
Agility statement	4.20
Responsiveness statement	4.08

To assess the humanitarian supply chain performance; three indicators from SCOR model were used namely reliability statement, responsiveness statement, and agility statement.

Based on the data collected and analysed.the first indicator reliability statement indicated a grand mean of 4.23 indicating that respondents gave their agreement to the following statements, humanitarian organizations provide: the right quantity of relief items to beneficiaries, they provide the right packaging for relief item and deliver with right condition, they provide relief item of high quality to beneficiaries, and organizations exhibited strong ability to perform tasks as expected and conducts need assessment accurately in disaster prone areas. This is in accordance with supply chain reliability concept where performance attribute of supply chain in delivering the right product, to the right place, at the right time with the right condition, packagingand quantity to the right beneficiary and measured in terms of perfect order fulfilment.

Secondly,respondents measured agility statement and given their strong agreement in the response with a grand mean of 4.20: An agile supply chain can respond to changing needs, in disaster relief operation of humanitarian supply chain operation; agility enables organizations respond to changing or unexpected demand. Survey respondents highly agreed to the following statements that their organization monitors the overall relief supply chain and responds immediately to minimize supply chain risk there by responding to disaster relief demand. This is supported by agility of supply chainin

responding to demand changes with the goal of saving lives and is measured in terms of supply chain flexibility andadaptability to changing disaster relief requirement.

Third performance indicator being responsiveness statement has been rated with a grand mean of 4.08; respondents believe that humanitarian organizations provide relief item as per their schedule, organizationshave standard time, speed at which humanitarian supply chain tasks should be performed, organizations provide relief item on time after their requisition and exhibit minimum order fulfilment cycle time to provide humanitarian logistics, and organizations provide relief within 72 hours of disaster strike.This is in line with the supply chain responsiveness concept in humanitarian supply chain which is the speed at which supply chain provides relief items to its beneficiaries; measured in terms of order fulfilmentcycle time.

4.6 Analysis of Interview

Interview was conducted with UN and INGOs heads of supply chain divisions to identify factors that affect humanitarian supply chain performance in disaster relief operations at the Somali region disaster response.

4.5.1. Humanitarian organizations supply chain management practices

Humanitarian supply chain practice in disaster relief operations depends on regular study of the operational context, which entails information gathering on transport market capabilities, road accessibility, market availability to procure supplies from the local market, and local storage capacity and availability. Most humanitarian organization in the Somali region engage in both slow and fast onset disaster relief operations in the region with strong supply chain practices of procurement, transport, storage, and information management regardless of formal and informal governing rules and standards.

Humanitarian organizations in the region have implemented central storage locations (to store disaster relief supplies) that are aiding as a staging pad for extended delivery points to distribute those supplies to different disaster inflicted locations.

Humanitarian organizations in disaster relief operations in the Somali region largely depend on commercial transport service providers and some brought in own trucks to supplement deliveries in difficult to reach areas.

4.5.2. Factors affecting humanitarian organizations supply chain management

Lack of competitiveness of project target area local market and transportation availability unlike other regions; unfavourably high transportation costs and degraded road facilities, lack of competitive local markets particularly zonal and district level markets, absence of legal documentation from markets(legal licence, tin number, accounts and invoice) from most whole sellers and retailers. It is obvious that operational limitations at local market level and unforeseen external factors always create a negative impact on its efficiencies in general.

Rapidly increasing operational requirement in relief supplies distribution like rapid on set disasters like flood affected people is another challenge faced by humanitarian organizations supply chain management in the Somali region.

With regard to fund: there exists a competition for fund among different organizations, its timing and release of short-term funds from donors, organizational procedures that hinder the efficient implementation of procurement process and timing of relief supplies delivery, organizations are also faced with pressure from government to deliver aid where there is fund shortage, problem of coordination between government and humanitarian organizations, delay of relief supplies due to different government restrictions, donor restrictions on some products categories, like drugs they specifically advise to procure from certain countries, lengthy custom regulations that cause delays at ports of entry.

Ethnic conflict: is one of the major threats to the successful implementation of the supply chain operation throughout the Somali Region. Deliveries to large segments of the region were often hindered by lack of access due to the conflict, looting of supplies during clashes, and burning of trucks. These attacks cumulated to the reluctance of commercial transporters to operate within the region and unable to cross borders through different regions, limiting the available transport services and increasing the cost of service.

Limited Logistics Services: There is a major limitation on the available logistics services throughout the Somali region due to multiple causes including lack of expertise and/or professionalism, unwillingness to encourage non regional business owners in the region, lack of financial capacity (mostly due to mismanagement), illiteracy, and traditional business practices. In addition, there exists competition for transport service demand from business and other actors,

Infrastructure:there is major lack of infrastructural development in the Somali Region. Road conditions are deplorable in majority of the region, ranging from rocky and mountainous landscapes,

to loamy soil vulnerable and affected by deep soil erosions. Roads and bridges are often washed away, making deliveries during the rainy season almost impossible. Road inaccessibility in fact drags out the lead time to deliver relief supplies to beneficiaries.

Interference: Governmental Interference is commonplace in the region, with regular attempts by government officials to influence every aspect of the supply chain operations when there is an immediate disaster response requirement, often with personal interest being the main motivating factor. Multiple attempts use to be made at every level of the government, to influence even standard processes that are common to all Supply Chain operations globally.

4.5.3. Humanitarian organizations supply chain management Performance

Most humanitarian organizations with underlined challenges were able to achieve effective disaster relief operation in the region in meeting the most vulnerable beneficiaries dignified needs in the past emergency relief operations in the region.

Humanitarian organizations were able to establish a joint operation in collaboration with the regional government they tried to better address the huge logistical and operational challenges in the region; this joint operation helped to resolve most of the challenges by setting uphubs closer to distribution points for receipt, storage, and dispatch of relief supplies, it has also established a local committee in order to address the need for close coordination between all relevant parties; this resulted in delivering relief supplies with in the right time.

Providing trainings to implementing partners and government counterparts on supply chain operation andinvested in building transport contractor's capacity through various trainings to strengthen their capacity and in the end get better service delivery. Humanitarian organizations alsopositioned mobile/temporary storage units to improve storage problems in locations where there is problem of storage capacity, and built bridge to facilitate smooth and timely relief aid delivery to beneficiaries,

When humanitarian organizations are unable to deliver relief supplies due to road inaccessibility due to flood, they tend touse light vehicles to access most inaccessible routes to deliver lifesaving relief supplies to beneficiaries, andapply cash transfer modality; so that beneficiaries could get the supplies through nearby local market suppliers. Some also imported trucks from abroad to capacitate the transport capacity in the region and increase response capability of organizations.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

This chapter presents the summary of the findings of factors affecting the performance of humanitarian organizations supply chain management in disaster relief operation at the Somali region. The aim of the study was to examine the factors that affect the performance of humanitarian organizations supply chain management.This chapter also presents the conclusions made from the findings, make recommendations based on the findings and suggest areas for further research.

5.1. Summary of Major Findings

According to results of the descriptive statistics obtained through survey questionnaire and interviews from humanitarian organizations heads of supply chain unit, identified most challenge that pose a challenge to an effective humanitarian supply chain management operation in disaster relief operations at the Somali region. The occurrence of supply chain management challenges in the humanitarian sector hinder supply chain efficiency in providing humanitarian assistance in disaster relief operation at the regionand is seen as hindering the timely delivery of life saving assistance to disaster inflicted population.

In addition to the challenges mentions in the literature; there are other challenge that are hindering the effective performance of humanitarian supply chain management operation: such as lack of competitiveness of project target area local market and transportation availability unlike other regions, pipeline breaks, clash between different clans that lead to road blockage around border areas, movement of beneficiaries from location to location, limited logistics Services, and government interference; all these factors have been hampering the efficient flow of relief supplies towards beneficiaries. Other factors includelack of coordination related challenges, information communications management challenges, transport capacity related challenges, port congestions and lengthy custom clearance procedures and inadequate warehouse or storage facility challenges.

Irrespective of the numerous challenges described above, disaster relief operation was largely successful due to several measures taken to address each challenge. Actions included continuous engagement with key stakeholders including the government, and various commercial and humanitarian partners. Because of the level of engagement established, organizations were able to expand the storage capacity in the region and increased the use of the additional port and collaborated with the government on various infrastructure projects and road assessments.

5.2. Conclusion

The main goal of this study is to assess the factors affecting the performance of humanitarian organizations supply chain management in disaster relief operation at the Somali region disaster relief efforts. According to this objective, the following conclusion is drawn. The empirical evidence from this study indicates that practice of disaster relief supply chain operation has been exercised by humanitarian supply chain organizations in the region and there are challenges that affect their performance in effective relief supply delivery. The supply chain challenges significantly contribute to the humanitarian relief operation inefficiency in the delivery of the relief supplies.

Both internal and external challenges have had a great impact on the efficient disaster relief operation of the humanitarian organizations disaster relief efforts. Degraded infrastructure was the main challenge in the disaster relief operation, followed by transport unavailability added with lack of experience from the local commercial transport contractors capacity and lack of experience cause a major challenge, demand uncertainty on the other hand was the other challenge since if there is no demand information it is impossible to predict where to start precisely on what is the number of beneficiaries in need of relief supply, their location and what kind of relief supply is required to cover the relief support demand, port congestion is another factor that was a hindering factor in the disaster relief operation, port Djibouti was the only entry corridor of relief supplies where also commercial sector was using, which creates a significant congestion and in the end delays or drags out the time to deliver of relief supplies, in the region there exists a significant security problem that hinders the delivery of relief supplies especially to those beneficiaries that are located around border areas added with government regulations that doesn't allow to freely transport relief supplies from place to place due to roads being blocked.

Humanitarian organizations supply chain management performance in disaster relief operation at the Somali region was not as simple as it looked; with underlined factors that affect their disaster relief operation; humanitarian organizations in the region were able to perform well during the disaster relief operation. They were able to deliver required relief supplies with the required quantity, quality, and packaging meeting the responsiveness statement that is highly required of them in the disaster relief operation where the aim is saving lives, and they were able to implement agile supply chain operation as the disaster relief situation demands to them to be as agile as they can be by quickly adopting to demand changes, with greater stock management and were monitoring the overall relief chain and were able to respond immediately to minimize supply chain risk. Humanitarian organizations in collaboration with government; were able to operationalise Berbera port that will

ease port congestion problem and reduce the distance to beneficiaries, in doing so injecting dollars to strengthen local economies. And they highly depend on an integrated end-to end system of supply chain management in addition to a strong partnership with private sector to endure maximum transport capacity.

5.3. Recommendation

The research findings implicate that humanitarian organizations supply chain performance is acceptable level; but there is a lot of work to alleviate the underlined challenges; to alleviate those challenges humanitarian supply chain should be able to operate in a cluster format; in fact there is a cluster group led by world food programme; as can be seen in the literature it became operational after the disaster has already stricken the population in the region; that took time to regroup identify challenges and try was to overcome those challenges, instead it is recommended to have a structured cluster group that all humanitarian organization in the country be part of it and devise a coordinated response mechanism; where they work in locating alternative routes to overcome road blocks, identify dry ports that connect these routed towards the location of the beneficiaries, provide trainings in advance to overcome knowledge gap, establish a team that can be immediately deployed to the disaster inflicted area, avail cluster transport to alleviate transportation problems, establish a formal communication and work in close connection with government to overcome security and other challenges.

5.4. Further research recommendation

One of the limitations of the study is unavailability of enough literatures written with specific context to the country and is limited to the specific region within the country focusing only the factors affecting the performance of humanitarian supply chain management in disaster relief operations. Further studies may consider studying the humanitarian organizations supply chain management at country level; with a specific dimensions of humanitarian supply chain management: like transport logistics operation in disaster relief, procumbent efficiency in disaster relief operation; Store management practices with prepositioning focus, supply chain cluster approach in the country.

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Annex I: Questionnaire

Questionnaire

ADDIS ABABA UNIVERSITY COLLEGE OF BUSINESS AND

ECONOMICS, SCHOOL OF COMMERCE

DEPARTMENT OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT

Questionnaire to be filled by: Supply Chain division employees of international NGOs and United Nations entities.

Dear Participant,

I am Frezewd Tefera, currently I am conducting a Research titled "Assessment of factors affecting the supply chain management performances of humanitarian organizations in disaster relief operation-the case of Somali region disaster relief efforts'' for the partial fulfillment of Degree of Master of Arts in Logistics and Supply Chain Management from the Addis Ababa University, School of Commerce. Hence, this questionnaire is designed to collect primary data to assessing factors affecting the performances of humanitarian organizations supply chain management in disaster relief operation the case of Somali region disaster relief efforts. The information obtained from this questionnaire will be kept confidential and will not be used for any other purposes. There is no need to write your name, hence, you are kindly requested to answer to the questions openly.

Thank you for your cooperation.

Your sincerely

Frezewd Tefera

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Addis Ababa, Ethiopia

General Instructions

- ✓ *It is not necessary to write your name*
- ✓ *Try to address the entire questions given below*
- ✓ *Where answer options are available, please tick (√) in the appropriate space provided.*

PART-I: General Information

This section intends to gather general information on the background of the respondent and the organization.

1. Gender:

A. Female ☐ B. Male ☐

2. Age:

A. 18-25 years☐ B. 26-30 years ☐

C. 31-40 years☐ D. above 40 years ☐

3. Educational Qualification:

A. Below grade 12 ☐ B. Grade 12 completed ☐

C. College Diploma ☐ D. First Degree ☐ E. Second Degree and above ☐

4. Your department/work unit:

A. Procurement ☐ B. Transport ☐

C. Warehouse ☐ D. Contracting ☐ E. Other _____

5. Years worked at the organization:

A. 1- 5 Years ☐ B. 6-10 Years ☐ C. 11-15 Years ☐

D. 16- 20 Years E. Over 20 Years ☐

6. How long have you been working in humanitarian supply chain related task?

A. Less than 2 Years ☐ B.3-5 years☐ C. 6-10 Years ☐ D. Above 10 years☐

7. Type of Organization:

A. United Nations entity☐ B. International NGO ☐

Part Two: Humanitarian Supply Chain Practices, Challenge and Performance

Below are questions related to factors affecting the performances of humanitarian supply chain management in disaster relief operations in the Somali region. Kindly indicate your level of agreement to the items by putting a tick mark **(√)** in the boxes provided. A scale of 1-5 is used to respond to the questions where:

Section One: Humanitarian Organizations Supply Chain Management Practices: Please indicate your level of agreement to the items by putting a tick mark (√) in the boxes provided. A scale of 1-5 is used to respond to the questions where: **5 = Strongly Agree, 4 = Agree, 3= Neutral, 2= Disagree, 1 = Strongly Disagree.**

S/No.	HSCM Practice variable	Humanitarian Organizations Supply Chain Practices	`1	2	3	4	5
1	**Fund Sourcing**	Sources of fund are mainly in-kind donations.					
		Sources of fund for disaster relief operations is mainly monetary donation.					
		Sources of fund for disaster relief operations is mainly government donation.					
		Funds are made available within the time set for disaster response.					
		Donation requirements are communicated instantly as per the need identified.					
2	**Procurement**	We apply competitive bidding for procurement of relief supplies in disaster relief operation.					
		We have the practices of preliminary need assessment in a disaster-prone area before procurement is made					
		We have the practices of Quantification of the need assessment is made before procurement					
		We have the practices of Selection of Suppliers and Contract provisions is in practice					
		We have the practices of Analysis of proposals					
		We have the practices of Selection of suppliers					
		We have the practices of Issuance of purchase orders and Administration of purchase contracts and resolution of related problems					
		We have the practices of Maintenance of a variety of purchase records					
3	**Transport**	We practice identification of the availability of transport services by type of transport					
		We practice mobilization of transport services with in shortest possible time to respond to					

		disasters					
		We undertake a survey of available transport service providers,					
		We practice identification of type of vehicle by means of its capacity,					
		We practice use of all modes of transport to efficiently support disaster relief operation,					
		We practice transport capacity planning					
		We have a practice of transport scheduling					
		We collaboration with commercial transport companies to improve response capability,					
4	**Storage and Handling**	We practice identification of potential points of storage to enable efficient disaster relief operation,					
		We practice identification of the required warehouse management equipment for stores,					
		We have a proper storage practice to efficiently utilize storage space,					
		We have a proper practice of handing supplies stored,					
		We practice screening of supplies to identify unwanted materials,					
		We practice definition of supplies by supply kits for shipment,					
		We have a practice of discharging supplies as per the need identified,					
		We practice inventory audit to avoid supply scarcity or surplus,					
5	**Distribution**	We practice definition of distribution points to minimize the distance to beneficiaries.					
		We design the flow of materials for distribution keeping in mind the people who require it,					
		We practice distribution of supplies from central distribution centers,					
		We practice the use of different distribution spots to deliver supplies to the people,					
		We practice timely distribution of relief supplies,					
		We practice push strategy of distribution where we do not have accurate demand information,					
		We practice pull strategy of distribution where we do have accurate demand information					
6	**Information management**	We practice adequacy of information sharing with different actors,					
		We employ information for proper supply chain planning,					
		We employ information as a tool for decision making during crisis,					
		We practice the use of information technology for controlling the efficient cost-effective flow of supplies,					
		We employ information management to integrate activities of the humanitarian supply chain,					
		We practice the use of information technology to coordinate with different supply chain actors,					

		We practice the use of information technology to distribute aid materials,					
7	**Reverse logistics**	We practice reverse logistics in case of supply of unsolicited goods.					
		We practice reverse logistics concept in handling rejected supplies.					
		We practice reverse logistics in handling expired relief supplies,					
		We practice reverse logistics in handling excessive supply of in kind donations,					
		We practice reverse logistics during response phase,					
		We practice reverse logistics during post disaster phase,					

Section Two: Humanitarian Organizations Supply Chain Management Challenges: Please indicate your level of agreement to the items by putting a tick mark (√) in the boxes provided. A scale of 1-5 is used to respond to the questions where: **5 = Strongly Agree, 4 = Agree, 3= Neutral, 2= Disagree, 1 = Strongly Disagree.**

S/No.	HSCM challenge variable	Internal Factors Affecting Humanitarian Organizations Supply Chain management	1	2	3	4	5
8	**Human resources**	Lack of professionals to deploy for relief operation with the required training, preparedness to effectively operate in the area negatively affects humanitarian supply chain management performance.					
		Unavailability of organized disaster response team in place negatively affects the humanitarian supply chain management performance.					
		Unavailability of human resource with adequate knowledge of disaster relief operation negatively affects humanitarian supply chain management performance.					
		Unavailability of professional with the required skill negatively affects humanitarian supply chain management performance.					
9	**Funding Bias**	Inadequate funds availability for disaster relief negatively effortsaffects humanitarian supply chain management performance.					
		There is tight donor scrutiny that negatively affects the humanitarian supply chain management performance.					
		Funding partner unavailability negatively affects the humanitarian supply chain management performance.					
		Delayed funding negatively affects the humanitarian supply chain management performance.					

		Donors being highly valued customers in the eye of the organization as compared to beneficiaries negatively affects humanitarian supply chain performance.					
10	**Information Technology**	Unavailability of funds for necessary information technology adoption negativelyaffects the humanitarian supply chain management performance.					
		Limited investment in information technology negatively affects the humanitarian supply chain management performance.					
		Unavailability of information technology expectsnegatively affects the humanitarian supply chain management performance.					
		Lack of advanced information technology tools during disaster response negatively affects the humanitarian supply chain management performance.					
11	**Supply chain coordination and management**	Lack of coordination amonghumanitarian supply chain actors negatively affects the humanitarian supply chain management performance.					
		Unavailability of people specialized in the coordination aspects affects humanitarian supply chain management performance.					
		Presence of specific policies related to humanitarian actor coordination in the region delay the response capability of the organization					
		Unavailability of virtual integration system to build supply chain integration negatively affects the humanitarian supply chain management performance.					
12	**Knowledge Gap**	Lack of debriefings for supply chain experts following relief operation deployment negatively affects humanitarian supply chain management performance.					
		Unavailability of lessons learned reports from previous disaster management event negatively affects the humanitarian supply chain management performance.					
		High turnover rate added with lack of career advancement among field supply chain experts negatively affects the humanitarian supply chain management performance.					
S/No.	**HSCM Challenge Variables**	**External Factors Affecting Humanitarian Organizations Supply Chain performance**	**1**	**2**	**3**	**4**	**5**
13	**Demand Uncertainty**	Demand uncertainty negatively affects the humanitarian supply chain management performance.					
		Uncertainty on the number of beneficiaries negatively affects humanitarian supply chain management performance.					
		Uncertainty on the types of relief items required by beneficiaries negatively affects the humanitarian supply chain management performance.					
14	**Degraded Infrastructure**	Poor infrastructure for relief supplies negatively affects the humanitarian supply chain management performance.					
		Degraded transport infrastructure (road infrastructure) negatively affects the humanitarian supply chain management performance.					
		Unavailability of communication infrastructure with disaster prone area negatively affects the humanitarian supply chain management performance.					

15	**Transportation Availability**	Post disaster transportation unavailability negatively affects the humanitarian supply chain management performance.					
		Limited availability of transport means after disaster strikes negatively affects humanitarian supply chain management performance.					
		Unavailability of ownhumanitarian vehicle fleetsaffects humanitarian supply chain management performance.					
		Inflation of cost of transportation in the disaster-pronearea negatively affects the humanitarian supply chain management performance.					
16	**Security Issues**	Lack of regular security assessments negatively affects humanitarian supply chain management performance.					
		Special regulations imposed by government to access some routes and airfields for transportation of relief supplies negatively affects the humanitarian supply chain management performance.					
		Conflict among different groups (internal conflict) negatively affects the humanitarian supply chain management performance.					
		Regulations on clearance and work permits for humanitarian supply chain experts negatively affects the humanitarian supply chain management performance.					
		Lack of strong operational security for humanitarian workers operating in insecure environments negatively affects the humanitarian supply chain management performance.					
17	**Port congestion**	Congestion at ports negatively affects the humanitarian supply chain management performance.					
		Having limited entry ports negatively affects the humanitarian supply chain management performance.					
		Lengthy lead time resulting from port congestions negatively affects the humanitarian supply chain management performance.					
		Delay in delivery of relief supplies that is resulting from port congestion negatively affects the humanitarian supply chain management performance.					

Section Three: Operational performance of humanitarian Supply Chain Management: Please indicate your level of agreement to the items by putting a tick mark (√) in the boxes provided. A scale of 1-5 is used to respond to the questions where: 5 = strongly agree, 4 = agree, 3= neutral, 2= disagree, 1 = strongly disagree.

S.N	Supply Chain Management performance dimensions	1	2	3	4	5
A	**Reliability Statement**					
1	My organization provides the right quantity of relief items to beneficiary					
2	My organization exhibited strong ability to perform tasks as expected					
3	My organization provides right packaging for relief item and deliver with right condition					
4	My organization provides relief item of high quality to beneficiaries					
5	My organization conducts need assessment accurately in disaster prone areas					
B	**Responsiveness Statement**	**1**	**2**	**3**	**4**	**5**
1	My organization provides relief item as per their schedule					
2	My organization has standard time, speed at which humanitarian supply chain tasks should be performed					
3	My organization provides relief item on time after their requisition					
4	My organization provides relief within 72 hours of disaster strike					
5	My organization exhibits responsiveness to donation-to-delivery time to provide humanitarian logistics					
6	My organization exhibits minimum order fulfillment cycle time to provide humanitarian logistics					
C	**Agility Statement**	**1**	**2**	**3**	**4**	**5**
1	My organization adapt quickly to a system of stock managing when there is stock out					
2	My organization adapt quickly to a system of stock managing when additional demand is required					
3	My organization monitors the overall relief supply chain and responds immediately to minimize supply chain risk					

Interview questions for heads of supply chain divisions of the selected organizations

1. How do you see the humanitarian supply chain practice of your organization's disaster relief operation in the Somali region?

_____

_____

_____

_____

_____

2. What major factors have been affecting your organization's supply chain management performance in the Somali region disaster relief operation?

_____

_____

_____

_____

_____

3. How was your organization's supply chain management performance during Somali region disaster response efforts?

_____

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