ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES
SCHOOL OF COMMERCE

HUMANITARIAN SUPPLY CHAIN CHALLENGES OF FOOD AID IN ETHIOPIA: IN THE CASE OF WORLD FOOD PROGRAM

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Addis Ababa, Ethiopia

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DECLARATION

I, the undersigned, declare that this study entitled “Humanitarian Supply Chain Challenges of Food Aid in Ethiopia: In the case of World Food Program” is my original work and has not been presented for a degree in any other university, and that all sources of materials used for the study have been duly acknowledged.

Declared By: Assefa Melese Zegeye

Signature _____

Date _____

CERTIFICATION

This is to certify that Assefa Melese Zegeye has carried out his research work on the topic entitled, “Humanitarian Supply Chain Challenges of Food Aid in Ethiopia: In the case of World Food Program”. The work is suitable for submission for the award of the Degree of Master in Logistics and Supply Chain Management at Addis Ababa University.

Research Advisor: Matewos Ensermu (PhD)

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Date _____

THESIS APPROVAL SHEET

This thesis, written by Assefa Melese Zegeye, entitled "Humanitarian Supply Chain Challenges of Food Aid in Ethiopia: In the Case of World Food Program" and submitted in partial fulfillment of the requirements for the degree of master of Logistics and Supply Chain Management complies with the regulation of the University and meets the acceptable standards.

Approved by Board of Examiners

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External Examiner:_____Signature _____ Date _____

Advisor: Matewos Ensermu (PhD) Signature _____Date _____

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Abbreviations and Acronyms

DPPB:	Disaster prevention and Preparedness Bureau
GoE:	Government of Ethiopia
GRN:	Goods Received Note
IFRC:	International Federation of the Red Cross and Red Crescent Societies
IOM:	International Organization for Migration
IRC:	International Rescue Committee
CRS:	Catholic Relief Service
INGO:	International Non-Governmental Organization
JEOP:	Joint Emergency Operation Program
MSU:	Mobile Storage Units
NDRMC:	National Disaster Risk Management Commission
FH:	Food for the hungry
PCA	Principal Component Analysi
SCF:	Save the Children Fund
TSF:	Targeted Supplementary Feeding
UN:	United Nations
UNOCHA:	United Nations Office for the Coordination of Humanitarian Affairs
UNICEF:	United Nations Children's Fund
WFP:	World Food Programme
WHO:	World Health Organization?
SS:	South Sudan
ARRA:	Administrative for Returnees and Repatriation Affair
IDP:	Internal displaced people
FDPs:	Food distribution points
GCMF:	Global Commodity Management Facility

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Abstract

The main objective of the study was to investigate the major challenges affecting the performance of humanitarian supply chain management in WFP. To achieve the objective of the study, close-ended questionnaires were prepared and distributed to the sample respondents. Variables of the study was measured through five-point Likert scale of measurement. Descriptive survey research design was mainly used to quantitatively analyze the challenges of humanitarian aid supply chain management. A cross-sectional survey data was employed in which 452 valid questionnaires were collected from 503 questionnaires distributed. Purposive (judgmental) non-probability sampling technique was used to select representative samples from the employees working in logistical & supply chain areas in WFP. Descriptive and inferential statistical techniques were used for data analysis. From descriptive statistics, frequency, percentage, mean and standard deviation techniques were used. From inferential statistics, factor analysis specifically Principal Component Analysis technique was used to identify the major challenges affecting humanitarian aid supply chain. Factor analysis methodology is selected because it is particularly suitable to extract few factors from the large number of related variables to a more manageable number. With the help of factor analysis, irrelevant questions can be removed from the final questionnaire. In order to determine the factors underlying the variables of the questionnaire used to assess the difficulties in managing the supply chain for humanitarian aid, this study proposed a factor analysis. In this study, the factorability of the data was evaluated using the Kaiser-Meyer-Olkin measure of sampling adequacy and the Bartlett's test of Sphericity. To investigate the multicollinearity of the variables, the determinant score is generated. Kaiser's Criterion and the Scree test were looked at to determine how many factors needed to be removed. Varimax orthogonal factor rotation method was applied to minimize the number of variables that have high loadings on each factor. The internal consistency was confirmed by calculating Cronbach's to test the instrument's reliability. The results revealed that the factor analysis not only allow detecting irrelevant items but also allow extracting the valuable factors from the data set of the questionnaire survey. The application of factor analysis for questionnaire evaluation provides very valuable inputs to the decision-makers to focus on few important factors rather than a large number of parameters. The factor analysis result revealed that humanitarian aid supply chain challenge determinant factors were related to infrastructure, transport, security and warehouses as far as humanitarian aid supply chain is concerned. Logistical challenges and poor infrastructure limit access to aid for already vulnerable and isolated communities. To overcome the challenges, the researcher recommended WFP to strengthen its efforts of humanitarian aid through mobilizing local economic actors to provide transportation and storage solutions adapted to the logistical, operational and security challenges of the context. WFP humanitarian activities should optimize aid resources in emergencies and complex emergencies, increase access to isolated communities, guarantee the quality and traceability of transport, limit the effects of inflation and promote coordination between response actors, the private sector, policy-makers and public authorities.

Keywords: humanitarian supply chain management, factor analysis, Kaiser-Meyer-Olkin, Bartlett's test of Sphericity, determinant score, Kaiser's criterion, Scree test, Varimax-orthogonal factor rotation

CHAPTER 1: INTRODUCTION

This chapter provides a brief overview of the study's background, problem statement, research questions and aims. It also discusses the study's significance, scope, limitations, definition of key terms and organization of the study.

1.1. Background of the Study

Every year, many people are being exposed to both natural and man-made disasters resulting in displacement and death of thousands across the world (International Federation of Red Cross 2010). According to a report by Development Initiatives (2017), worldwide over 377 million people were affected by disasters associated with natural hazards in the year 2016. The report shows that compared to the year 2015 estimate, the number of people exposed to natural disasters in 2016 has increased by more than 267 million people demanding about $27 billion for humanitarian assistance. Noteworthy to mention some of the recent highly catastrophic crises the world is witnessing include those occurred in South Sudan, Somali, Yemen, Syria, Iraq, India, Rohingya Muslims in Myanmar and many others which have claimed the lives of millions of people and left others homeless (UNOCHA, 2017). Under such situations, the presence and relevance of humanitarian organizations is very critical to allow the victims have access to basic humanitarian supplies.

Although the phrase "supply chain management" is relatively new to the public lexicon, the practice has been around for more than a century (Taylor, 1911). Humanitarian crises involve a complex network of participant organizations, including governments, military agencies, civil society, private companies, and relief organizations (Venkatesh et al. 2019; Yadav and Barve 2015). These situations demand a high level of dependability and adaptation to meet the needs of vulnerable people. This network, which includes a number of actors and can be thought of as a humanitarian supply chain, aims to offer the most support to the impacted population in terms of food, medical supplies, and other aid resources (Dubey and Gunasekaran 2016). According to Fosso Wamba (2020), HSCs encompass all tasks related to gathering and controlling the resources needed for disaster relief efforts, whether they are caused by a natural disaster or human activity (Abidi et al., 2013). The goal of humanitarian logistics is to get these materials to the victims as efficiently as possible (Chandes and Paché, 2010). Nikbakhsh and Farahani (2011) state that the necessity for

logistical systems that can deal with various disasters and disruption management has drawn significant attention to the field of logistics in the context of humanitarian operations.

Ethiopia's humanitarian response has increased as more entry points have opened and some remote locations have become more reachable. On the health front, the county is experiencing epidemics of cholera, malaria, and measles, for which partners are implementing preventative and corrective measures. Many vulnerable people have also lost their means of support as a result of the drought, which has also exacerbated health concerns if malnutrition wasn't present already and kept hundreds of thousands of kids out of school. More people are being driven from western regions of the country due to insecurity and conflict.

The World Food Programme (WFP) is the foremost humanitarian organization against hunger globally, providing food aid in emergencies and working with communities to improve nutrition and foster resilience. Each year, WFP helps 91.4 million people in about 83 countries.

Since 1961, the World Food Program (WFP) has been working in Ethiopia, providing food and non-food goods to areas impacted by natural and man-made disasters. The cluster operation, which involves numerous organizations/NGOs, UN agencies, and government partners including CRS, ICRC, IOM, NDRMC, ERC, EMAA, JEOP, FHE, SCF, OCHA, and UNICEF, is also led by WFP Ethiopia. As a premier organization, WFP offers transportation services to move both food and non-food items from one location to another. Additionally, WFP employs LSCM side by side for its routine tasks, which include numerous components like Emergency Relief, Refugee, TSF, and FFE.

The five-year Growth and reform Plans of the Government of Ethiopia aim to achieve middle-income status for the nation by 2025 by maintaining high growth and accelerating structural reform, in spite of these obstacles. The World Food Programme (WFP) supports this objective through a variety of life-saving and resilience-building initiatives that are aimed at disadvantaged groups experiencing both acute and chronic food insecurity, such as refugees and internally displaced persons (IDPs), as well as those who are at risk of malnutrition.

Additionally, WFP supports the Productive Safety Net Programme (PSNP) of the Ethiopian government, which offers millions of chronically food-insecure rural households regular, multi-year assistance to help them wean themselves off of receiving emergency food assistance.

The WFP offers unconditional food and cash transfers to the most vulnerable families throughout Ethiopia, school feeding programs, and assistance to smallholder farmers to help them adapt to a changing climate in order to supplement the work of the Government of Ethiopia and address the most urgent food security needs (WFP country brief, 2022).

Despite increase in demand for humanitarian assistance in different parts of the world, humanitarian organizations are experiencing a number of supply chain management challenges (Kovács and Spens , 2009). For example, according to Ergun et al. (2009) supply chain management challenges that humanitarian organizations face include frequent turnover of employees, level of knowledge of humanitarian organizations and capacity of the stakeholders, dilemma of donors in terms of providing funds for the humanitarian operations. Moreover, Kinyua (2013) identified supply chain challenges of humanitarian organizations which are related to supply chain coordination, capacity of local transport, warehousing capacity, facility at the port and government policies.

It is known that challenges associated with supply chain can lead to delays in delivery of humanitarian supplies to the affected people and increasing cost which ultimately leads to huge loss of life (Nyamu, 2012).

The entire processes require efficient humanitarian supply chain management which plays paramount contributions for procurement and transport of food commodities from its origin to final destinations where it is proposed to be consumed or utilized. In this study, the researcher attempted to investigate the humanitarian supply chain challenges that WFP experiences while operating food aid supplies in Ethiopia.

1.2. Research Problem

The human population has been devastated by the rising number of disasters in Ethiopia. As seen by their tardy reaction to crises, the bulk of humanitarian groups' supply networks are underdeveloped (Danish Refugee Council, 2011).

The humanitarian groups struggle with a number of supply chain issues that prevent them from reacting to crises in a timely manner. International humanitarian groups are just one of the many important participants in the disaster response process. Humanitarian organizations must adopt diverse supply chain principles, much like the corporate sector, in order to make informed judgments and, more significantly, to carry out their activities more thoroughly (Munguti, 2013).

4.5 million Ethiopians required food aid during the Horn of Africa crisis, compared to 10.2 million in 2016. In 2011, there were 328,750 cases of severe acute malnutrition (SAM), whereas 2016 is expected to see 458,000 cases. Since 2011, when Ethiopia was hosting around 300,000 refugees from South Sudan, Somalia, Eritrea, Sudan, and other countries, the number of refugees has more than doubled to 734,931 (OCHA, 2017). Additionally, the effects of the drought caused by the Indian Ocean Dipole in southern and eastern Ethiopia persisted throughout 2017 and were made worse by disease outbreaks, widespread losses of assets used for subsistence, and displaced populations. A third consecutive year of below-average spring rainfall in the southern drought zone at the time added to the already dire humanitarian situation nationwide. A total of 8.5 million people required emergency food assistance in the second half of 2017, 3.6 million children and mothers who were pregnant or nursing needed extra food, 10.5 million lacked regular access to safe drinking water, and 2.25 million households required assistance with livestock. Additionally, according to partners' estimates, 376,000 kids were severely acutely malnourished as of the end of 2017 (OCHA, 2017).

The 2017 Humanitarian Requirements Document (HRD) was released on January 17 by the government of Ethiopia and humanitarian partners in response to the government-led multi-agency and multi-sector *Meher* needs assessment that was conducted in November and December of 2016. In 2017, the study determined that 5.6 million individuals would need emergency food assistance. Additionally, almost 9.2 million individuals would need WaSH

support, about 1.9 million families will need livestock help, and about 2.7 million children and mothers who are pregnant or nursing and have moderate acute malnutrition will need supplemental feeding (TSF). According to estimates from the government and its partners, 2 million schoolchildren will need assistance with school meals and school WaSH over the year, and 303,000 children will suffer from severe acute malnutrition (UNOCHA, 2017).

According to the Ethiopia El-Nino drought response lessons learned report that UNOCHA published in January 2018, the Ethiopian government took the lead in responding to the drought, and the National Disaster Risk Management Commission (NDRMC) was in charge of overseeing the coordination of humanitarian aid delivery. In order to assist the GoE and NDRMC in their response, identify logistical gaps and bottlenecks, suggest mitigating measures, and improve the logistics coordination, information management, and logistical capacity of the government and other humanitarian actors, the Logistics Cluster was activated through WFP, the global lead agency, in March 2016.

The Logistics Cluster team conducted a supply chain gaps analysis in April 2016 in collaboration with regional partners. According to the analysis, there are a number of obstacles to overcome, including traffic at the port of Djibouti, a shortage of transporters, improper contracting practices, a lack of adequate storage space, delays in distribution, delays at customs clearance, a lack of logistics supply chain coordination, and a lack of timely and useful information sharing. Additionally, according to the humanitarian situation report from 2017, the following significant difficulties were noted as some of the many issues affecting the El-Nio catastrophe response: Lack of funds, which prevented a prompt response, port congestion at port Djibouti, Ethiopia's primary upstream entry point for commercial and humanitarian cargo, and the pipeline break that resulted from long procurement lead time and lengthy custom process, Security problems that are caused by repetitive ethnic clashes in the region, Inadequate storage capacity, lack of visibility with regard to information with in the supply chain, shortage of human resource, and knowledge gap.

It was evident that a disaster response operation faces difficulties acquiring humanitarian supplies through the supply chain, which actually slows response time. Delays in providing aid-especially food-will make people suffer more, lengthen the time it takes for them to

recover, put additional strain on the existing institutions for humanitarian relief and development, and raise the cost of interventions.

Food distribution for beneficiaries occurs far from where they live, requiring them to travel for roughly half a day and others much longer due to inaccessible infrastructure (roads). There is a lack of commercial transportation to move humanitarian food aid from the WFP warehouse located in the 11 hubs to the warehouses of the various FDPs/IDPs and partner organizations (WFP, 2016). There are instances where humanitarian aid cargo is not used as planned-that is, to respond to emergencies and support FFE, TSF, or PSNP programs and does not reach the intended beneficiaries.

Furthermore, no adequate investigation of the humanitarian supply chain (the distribution of food aid) has been conducted in terms of quick reaction to disasters that could happen at any moment, anywhere in Ethiopia. Therefore, this study suggests a way to implement an integrated food distribution that is timely and ensures the food aid is used for its intended purpose.

1.3. Research Questions

The biggest obstacle to the humanitarian supply chain's ability to distribute food is inaccessible infrastructure due to disasters and their effects, which has a detrimental impact on how humanitarian relief organizations respond. Disasters have devastating effects, necessitating immediate and efficient preparedness measures. Therefore, it is essential to take a retroactive approach, which entails identifying the operational breakdowns in previous responses, so that humanitarian organizations can respond to whatever type of disaster may occur and overcome the previous drawbacks.

The following research questions were attempted to be answered based on the study's context and problem statement:

1. What kind of challenges humanitarian supply chains were facing in WFP?
2. What are the major challenges that affect the humanitarian supply chain in WFP?

1.4. Objectives of the Study

1.4.1. General Objective

The main objective of the study was to investigate the major challenges (factors) affecting the performance of humanitarian food aid supply chain management in WFP.

1.4.2. Specific Objectives

- To establish the challenges facing humanitarian supply chain in WFP.
- To identify the major challenges affecting humanitarian supply chain management performances of WFP.

1.5. Research Hypotheses

Taking into consideration the theoretical and empirical literatures, the researcher formulated the following hypotheses to be tested & validated after conducting the statistical analysis using the collected data from the respondents. Hence, the followings were the research hypotheses formulated to be accepted or rejected ultimately based on the findings of the study.

H_1: Infrastructure challenges have statistically significant difference to determine Humanitarian Supply Chain Performances.

H_2: Transport challenges have statistically significant difference to determine Humanitarian Supply Chain Performances.

H_3: Security challenges have statistically significant difference to determine Humanitarian Supply Chain Performances.

H_4: Storage challenges have statistically significant difference to determine Humanitarian Supply Chain Performances.

1.6. Significance of the Study

Supply chain of emergency relief response in humanitarian field is highly time sensitive activity as far as lifesaving of the victimized community is concerned. When the magnitude

and size of disaster is increasing parallelly the humanitarian aid intervention is also taking place massively, deploying assorted type of commodity, clothing, medicine, different machinery, and personnel, all these resources mobilize from different sources, so therefore there is always a case the supply chain in particular food aid distribution is mismanaged due to the massive donation arrived in the affected area. Also, In the occurrences of disaster the supply chain management of emergency response is facing different challenges, for instance procuring and transporting large amounts of different relief commodities and various resources from different points of origin to different destinations of disaster-prone areas, Hence, the bottom line in supply chain process is to timely reaching the needy people and increasing the survival rate of affected population, reducing their suffering.

In order to help humanitarian supply chain employees respond to unexpected disasters and come up with potential solutions that could lessen potential human suffering in the quickest feasible time, this research aims to offer techniques for better disaster response. The outcome of this study will assist humanitarian organizations in adopting a tried-and-true method for controlling the distribution of food aid in any supply chain management operation in Ethiopia from a WFP perspective.

Further, this study benefits the government, funders and other collaborators to assist in reducing the pressures that these stakeholders place on humanitarian management. The stakeholders, who are the primary funders of humanitarian organizations, will be able to develop policies that allow them to pursue long-term objectives like supply chain management that will improve performance while also ensuring that they meet short-term objectives of accountability and transparency in the use of funds.

In addition to serving as a source of reference, the findings would be helpful to upcoming researchers and academicians because they expanded the body of current information. The report also identifies topics for additional investigation so that academics and researchers in the future might deepen their understanding. To generalize the findings, academics can conduct more research on supply chain management difficulties.

1.7. Scope of the Study

The study focused on the supply chain of the humanitarian food aid delivery being challenged due to a various drawbacks across WFP targeted areas of food prone regions and

localities within Ethiopia. Majority of the places where large number of populations those who need humanitarian relief assistance that WFP is currently engaged in are *Amhara, Afar, Tigray, Somali, Gambela, Benishangul* and it is these places the study was focussing on.

As several issues/challenges related to humanitarian supply chain management in humanitarian food aid operations of Ethiopia, this study aimed at limiting itself on figuring out the major challenges affecting food distribution and comes up with possible outcome which will alleviate the challenges.

More specifically, the scope of the study was delimited conceptually, geographically and methodologically which is described as follows. The geographical scope of the study was delimited to only World Food Program in Addis Ababa and outlying Sub-Offices (*Amhara, Afar, Tigray, Somali, Gambela & Benishangul*). Regarding the conceptual scope, though there are many challenges affect humanitarian supply chain performances, the researcher was forced to considered only four main challenges namely infrastructure, transport, security and storage.

The methodological scope of the study includes descriptive statistical techniques like frequency, percentage, mean & standard deviation to summarize as well as to describe the response of participants. From inferential statistical techniques, factor analysis mainly Principal Component Analysis (PCA) was employed. Regarding the research design, the study employed descriptive survey research design and cross-sectional survey data was employed.

1.8. Limitation of the Study

The researcher encountered various difficulties in administering and analyzing the data collection, which could ultimately have an impact on the study's caliber. For fear of disclosing sensitive or private information, some respondents refused to supply primary data. However, the researcher made sure that the study's objective was properly communicated and reassured respondents that any information they submitted would be kept anonymous.

One limitation or problem that prevented the achievement of the research objectives was the paucity of recent literature in the field and the comparatively scant empirical evidence regarding the difficulties in the supply chain for humanitarian food aid. Additionally, there

were time and funding limitations on this investigation. As a result, future studies should be able to identify with additional supply chain difficulties for humanitarian food relief.

1.9. Definition of Terminologies

Disaster: is defined by various academics and the United Nations as "a serious disruption of society's functioning, resulting in widespread losses of people, property, or the environment that exceed the capacity of the affected people to cope using only its own resources" (United Nations, 1992).

Supply Chain Management: The management of the full manufacturing flow of a good or service, from the procurement of raw materials to the delivery of the finished product to the customer, is known as supply chain management.

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 definition of a disaster, according to many academics and the United Nations, is "a serious disruption of society, resulting in widespread losses of people, property, or the environment that exceed the capacity of the affected people to cope using only its own resources." (United Nations, 1992).

Relief: In the context of this research article, relief is defined as the provision of emergency food, shelter, and services in the immediate wake of a natural or man-made disaster (Thomas, 2003). According to Long and Wood (1995), relief frequently implies a foreign intrusion into a society with the intention of assisting the locals. As a result, the main objective of disaster relief organizations is to lessen the effects of disasters and the suffering of those who are affected (Kelly, 1995).

Humanitarian Organizations: Humanitarian organizations are those that are typically engaged in the following activities: finding, gathering, and transporting the injured and sick, missing, and dead; treating the sick and injured; assisting prisoners of war; and assisting the civilian population by way of humanitarian relief. (ICRC 2014).

Humanitarian Assistance: In accordance with the fundamental humanitarian values of humanism, impartiality, and neutrality, humanitarian assistance is help that aims to save lives and lessen suffering among a community afflicted by a disaster (Relief, 2008).

1.10. Organization of the Study

There are five chapters in this study. Which starts with Chapter 1, where the chapter gives an introduction under which brief background of the study was revealed, research difficulties, and research questions, were also correctly appraised, after which, scope, and limitations of the study was also explained. The second chapter comprised studies of relevant theoretical literature and empirical research that described connected study themes. From these reviews, a conceptual framework was created and was included. In the third chapter, the research methodology was covered. The results and a discussion of the conclusions would be included in the fourth chapter. The study's summary, results, and suggestions were presented in the fifth chapter.

CHAPTER TWO: REVIEW OF RELATED LITERATURE

Based on previous research and writings by other scholars in the fields of humanitarian supply chain management, disaster relief operations, and supply chain endeavours, this chapter revealed and intellectualized literatures related factors that influence the performance of humanitarian supply chain management in disaster relief operations. This chapter's main goal is to help the reader retain important information on the topic of SCM, which has an impact on how well the humanitarian supply chain functions. It also provides a general overview of the SCM of food aid distribution across WFP Ethiopia's targeted areas.

2.1. Theoretical Framework

2.1.1. Supply Chain Management Theories

There are numerous publications on supply chain performance measurement, according to (Garcia, et. al, 2012), with a variety of techniques, with diverse objectives and circumstances. The balance scorecard, which combines several pertinent criteria, is a frequently used framework for performance measurements (Kaplan and D. Norton 1992). The balanced score card, which offers a quantitative perspective of the dynamics of the distribution logistics networks using dashboards, was also applied to supply chain management by Bhagwat and Sharma (2007).

2.1.1.1. Supply Chain Operations Reference (SCOR) Framework

The Supply Chain Council (SCC) created SCOR to assess the overall efficacy of a supply chain. It is a supply chain management reference process model that offers a framework connecting business process, KPIs, best practices, and technological elements into an integrated structure. The most popular model for describing supply chains using a shared set of definitions is SCOR, which may be applied to different organizational types. The model includes both a customer's customers and a supplier's suppliers. It outlines the business procedures necessary to meet consumer demand and offers a foundation for how to enhance corporate operations. The supply chain operations are prioritized, the potential benefits of a particular process modification are quantified, and financial justifications are established using benchmark and best practice data (Cheng, et. al, 2010). Process re-engineering, benchmarking, and measurement are all business concepts that SCOR has included into its framework (Huan, et. al., 2004). It covers all interactions with customers (from order entry to paid invoice), all physical material transactions (from supplier to customer's customer, including equipment, supplies, spare parts, bulk products, software, etc.), and all interactions

with the market (from comprehension of aggregate demand to order fulfilment). It does not try to cover all company procedures or activities. Reliability, responsiveness, agility, costs, and asset management are the corresponding performance attributes in the SCOR model. According to SCOR, supply chain performance is defined as the capacity to deliver the right product at the right time, in the right amount and quality, with the right documentation, and to the right client. A supply chain's responsiveness is measured by how quickly it delivers goods to customers, and its agility measures how quickly it can adapt to changing market conditions.

2.1.1.2. Network Theory in Supply Chain Management

Network theory, according to Halldorsson et. al. (2007), tries to comprehend how individual personalities of supply chain participants might affect the development of trust and long-term loyalty. According to the notion, direct contact is seen as a facilitator for establishing distinctive relationships, which could lead to the supply chain being customized to satisfy the distinctive client wants (Halldorsson, et. al., 2007). The Network Theory (NT) states that two types of interactions shape the networks of a company: the interchange of information and goods, and the adaptation of these processes, such as legal, logistical, and technical ones (Halldorsson, et. al., 2007). Through these interactions, the network's participants can develop mutual trust (Halldorsson, et. al., 2007). NT is frequently used as a descriptive tool to map the supply chain's capabilities, such as its members and resources ((Halldorsson, et. al., 2007).

2.1.1.3. Stakeholder Theory in Supply Chain Management

Academics and business executives are debating the transition away from growing shareholder profit and toward maximizing stakeholder satisfaction (Sajjad et al., 2015; Park-Poaps and Rees, 2010; Huq et al., 2016, Co and Barro, 2009). Strategic analysis and fresh understanding are necessary to manage and align the interests of stakeholders. The stakeholder theory was developed for this reason (Phillips, 2003). Stakeholder theory, as opposed to other theories in strategic management, was initially developed for the discipline of strategic management to highlight ethics and morals in decision-making (Friedman and Miles, 2006). Stakeholder theory is essentially concerned with the interests and welfare of the stakeholders in an organization (Phillips, 2003).

Stakeholders in this context include everyone who has the power to positively or negatively affect a company's success (Phillips, 2003). A sustainable supply chain has been the

objective for supply chain management due to rising consumer demand (Padhi, 2018). Supply chain managers are increasingly aware of their suppliers' business practices despite the implied goal of acquiring awareness and a positive reputation by promoting a business as sustainable. Stakeholder theory can be used in this case to better understand the dynamics of various supply chain stakeholders. Stakeholder theory was first introduced by Freeman in 1984, and Donaldson and Preston categorized it into three categories in 1995: normative, descriptive, and instrumental approaches (Friedman and Miles, 2006). According to the idea, common behaviours and expectations rise as network density rises, which is referred to as better connectivity and communication between network participants. As a result, the likelihood that the network will be able to restrain the focal organization is raised (Friedman and Miles, 2006). The organization's position is crucial in avoiding potential restrictions (Friedman and Miles, 2006). The organization has more influence over the parties when it is more fundamental to the supply chain. The number of ties inside the network (centrality), proximity as independent access to others, and control over others are what give an organization its power over the network, according to Rowley (1997).

According to Oloruntoba and Gray (2006), there are an increasing number of players and organizations working in the civil, corporate, and military sectors that provide humanitarian relief. According to Thomas and Kopczak (2005), both corporate and humanitarian logistics cover a variety of tasks, such as planning, purchasing, transit, warehousing, tracking and tracing, and customs clearance. The delivery of goods and/or services to the end user, whose immediate and long-term survival may depend on the successful completion of logistics and supply chain operational activity up to and including the crucial "last fifty meters," necessitates a sophisticated coordination of activities.

2.2.Theoretical Literature Review

2.2.1. Humanitarian Supply Chain and Logistics

2.2.1.1. Humanitarian Logistics

“Disaster logistics, also known as humanitarian aid logistics, is designed to cover the needs of damaged and vulnerable individuals and to alleviate their suffering” (Adiguzel, 2019). According to the International Federation of Red Cross and Red Crescent Societies in 2015, “Humanitarian logistics consists of processes and systems involved in mobilizing people, resources and knowledge to help vulnerable communities affected by natural disasters or complex emergencies. It seeks a prompt response, aiming to serve the largest

number of people, avoid shortages and waste, organize various donations and, above all, operate within a limited budget".

According to Apta (2009), "humanitarian logistics is a critical element of an effective disaster relief process and is described as a special branch of logistics with challenges such as demands surge, uncertain supplies, critical time window in face of infrastructure vulnerabilities and vast scope and size of the operations". So humanitarian logistics is defined as "the process of planning, implementing and controlling the efficient, cost-effective flow and storage of goods and materials as well as related information from the point of origin to the point of consumption for the purpose of alleviating preparedness, planning, procurement, transport, warehousing, tracking and tracing, customs and clearance" (Beamon & Balcik, 2005).

Kovács and Spens (2010), described humanitarian logistics as "a function that encompasses very different operations at different times, and as a response to various catastrophes. All these operations have the common aim to aid people in their survival. Nonetheless, aid to assist the development of a region, famine aid and the running of refugee camps is substantially different from the kind of aid needed after a natural disaster".

According to Daud (2016), "humanitarian logistics encompasses the process of mobilizing people, resources, skills and knowledge to help the disaster's victim. In the humanitarian process, logistics is the central of all the mobilization activity as it served as the bridge between the disaster preparedness and response, procurement and distribution and headquarters and the field. It also can be one of the most expensive parts in the relief operation and the effectiveness of the operation is always being monitored in order to improve the operation and to minimize the operating cost with the maximum of result's operation" (Kovács and Spens, 2010).

Finally, evidence can be found that humanitarian logistics refers to the activities which manage the logistical flows, in case of disasters. It is to save lives and make available the resources corresponding to the needs determined by respecting the type and impact degree of the disaster, the service expected, safety and security conditions deemed satisfactory.

Large-scale operations, unpredictable demand, and unexpected limitations are characteristics of humanitarian logistics (Beamon and Kotleba, 2006). According to Kovacs and Spens (2009), the issues can range from a shortage of electrical sources to a lack of transportation infrastructure, including a "controlled" environment with some minimal

fluctuation (such as traffic congestion). Donors, or supply, are what propel humanitarian groups most of the time (Tomasini and Van Wassenhove, 2009). Customers (aid receivers) don't actually have a choice, hence "true demand" in humanitarian logistics isn't generated (Kovacs and Spens, 2009).

2.2.1.2. Humanitarian Supply Chain

A humanitarian supply chain is a procedure that integrates, plans, and regulates the flow of supplies, goods, and associated information from suppliers and donors to satisfy recipient needs promptly. The humanitarian supply chain includes both emergency aid and ongoing assistance for poor nations. It involves delivering aid in the form of products and services to the recipients who need them (Fritz Institute, 2012).

When providing aid to disaster victims, the supply chain of humanitarian organizations is extremely important. This involves the planning and management of all sourcing, procurement, and logistics management activities. It also entails coordination and collaboration with actors who can be suppliers, intermediaries, donors, beneficiaries, and third-party service providers, as well as operational activities and programs for development in times of disaster (CSCMP, 2008).

Additionally, HSCM calls for the process of creating plans, implementing those plans, and monitoring aid flows (i.e., materials, goods, services, financial resources, information, etc.) from the point of origin to the point of consumption with the goal of satisfying the needs of aid recipients (Thomas and Mizushima, 2005). Both academics and practitioners are now interested in this topic (Dubey, 2015).

2.2.1.3. Humanitarian Supply Chain Management

More disasters have occurred recently than at any previous period in history, both natural and man-made, and they have had an impact on more than 5 billion people worldwide. The Center for Research on the Epidemiology of Disasters (CRED) estimates that the total loss from all disasters has exceeded US$150 trillion and resulted in the eviction of more than 180 million people. The largest earthquakes in the past ten years were those in Iran (2003), Sumatra (2004), Pakistan (2005), China (2008), Haiti (2010), Japan (2011), and Nepal (2015). The most recent earthquake was in Nepal in 2015 (Klinenberg, 2015). As a result, better catastrophe preparedness is required. Being prepared makes it easier to deal with a disaster, reduces the danger, and lessens the suffering it causes. The government, non-governmental groups, and donors who have pledged millions of dollars in relief in various

ways have also placed humanitarian aid organizations under tight assessment today. The donors display responsibility and openness in such circumstances because they anticipate their aid will reach the intended recipients (Van Wassenhove, 2006).

The planning and management of all sourcing and procurement, conversion, and logistics management activities fall under the purview of supply chain management, according to the Council of Supply Chain Management Professionals (2011). Additionally, it entails coordination and cooperation with other parties, including implementers, beneficiaries, donors, suppliers, and third-party service providers. The integration of supply management and needs assessment within and among humanitarian organizations and other actors is crucial, and it is achieved through HSCM.

It is now crucial for humanitarian groups to carefully prepare and carry out their relief initiatives. In any humanitarian aid effort, logistics make up the majority (about 80%) of the relief activities. Therefore, only efficient and effective tactics, or managing the supply chain, may be used to manage the flow. The logistics management team handles the procurement and management of food, non-food supplies, and gifts-in-kind (both requested and unrequested) from appeal in any disaster. It involves keeping an eye on the financial and commodity data while the humanitarian aid is distributed. In these circumstances, reliable and timely information becomes essential. Using this data, relief managers attempt to gather resources to serve the recipients while also appealing to their donor (Tomasini & Van Wassenhove, 2009).

According to Thomas and Mizushima (2005), the process of effective and economical plans, implementations, and controls for aid flows (those financial and in-kind donations) from the point of origin to the point of consumption is necessary for the humanitarian supply chain in order to meet the needs of the recipients of relief aid. It includes all the operational procedures such as sourcing, procurement, inventory management, transportation and distribution, information management, and so forth as a subset of supply chain management (Day, 2012). The main objective of the humanitarian supply chain is to lessen human suffering, more precisely to stop additional human misery and death as well as to immediately treat people who are ill or injured (Beamon and Balcik, 2008). These days, this region has drawn the interest of both academics and practitioners (Dubey, 2015)

Since natural or man-made disasters can strike anywhere in the world at any moment and have devastating effects, humanitarian SCM has become a well-recognized issue (Carroll

and Neu, 2009; Tomasini and van Wassenhove, 2009; Kovács and Spens, 2007; Yamada et al., 2006). As a result, providing timely and appropriate humanitarian aid has grown into a global and multinational industry (Carroll and Neu, 2009), and increasing attention is being paid to the optimization of the supply chains and logistics responsible for converting public and private donations into usable aid. To prevent arbitrary resource allocation during disasters, there is now an urgent need to coordinate the logistics resources of the public and private sectors; however, inefficient 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 is acknowledged that the humanitarian relief effort focuses on "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). It is also acknowledged that "logistics planning and coordination need to be seen as essential rather than merely desirable" (Rickard, 2003) in humanitarian relief operations.

2.2.2. Challenges of Humanitarian Supply Chain Management

In the current world, disasters are occurring more frequently and with greater intensity, which has a worrisome effect on many nations' way of life (International Federation of Red Cross, 2010). Humanitarian organizations must be better prepared in every way if they are to respond to emergencies and deliver timely relief to those in need through efficient humanitarian supply chains (Nyamu, 2012). However, these groups do face a number of challenges that must be acknowledged.

Humanitarian assistance organizations have many challenges in order to provide their services efficiently. It is challenging to create a good pre-positioning strategy when there is uncertainty about the likelihood, location, and extent of natural disasters (Rawls and Turnquist, 2010). Most commercial supply chain managers find disaster relief chains to be frustrating due to their unique characteristics and peculiar operating conditions (Whybark, A Melnyk, Day, and Davis, 2010). For instance, while a commercial supply chain's strategic aims are to produce financial returns for shareholders and deliver value to customers, a relief chain's primary goal is to save lives and reduce suffering, damages, and losses (Chakravarty, 2014). Besiou, Stapleton, and Van Wassenhove (2011) estimate that hundreds of humanitarian organizations, including national and local governments, the military, private companies, and people, may be present at a catastrophe site at any

given time. Goal-setting and prioritizing relief efforts can be very challenging because of the many parties participating in the chain of relief, the diversity of ideologies and religious beliefs, competing goals and interests, and the lack of coordination (Balcik and Beamon, 2008).

The issues facing the humanitarian supply chain have been well-documented in several papers and academic studies. The challenges are still being encountered today. Thus, Kabra and Ramesh (2016) identify several factors in his research, the most significant of which are frequently ambiguous political conditions, bureaucracy and corruption in recipient countries, a lack of accountability, the involvement of commercial and non-commercial organizations, and a lack of staff with logistics training. Lack of adequate facilities for logistical training in both developing and advanced industrial nations, a bias toward giving to short-term aid projects rather than relying on inefficient internal systems within aid organizations, and an excess of volunteers and inexperienced staff within aid organizations, coordinating and working together with stakeholders. While Roh et. al., (2015) concentrated on logistical challenges such as high asset maintenance costs, high inventory costs, uncertain demand, inventory lack of confidence, failure to forecast inventory levels, high transport costs, challenges justifying funding, limited space, infrastructure, inventory, collapse, dependence on logistics providers, poor commodity quality, the poor performance of logistics providers, local staff quality, and natural disasters These hazards can be divided into two categories: external problems and internal challenges, both of which impede the execution of humanitarian supply chain operations.

Billions of dollars are donated by donors to national and local charities for relief efforts, and many NGOs rely completely on these donations to help catastrophe victims. Donors do so out of goodwill and for humanitarian purposes, even though they are not required to fund any calamity. However, they want a close analysis of the monies given to relief organizations and a thorough investigation into whether such organizations meet donor requirements for accountability, transparency, and value for money. The donor has the option to stop working with any or all groups that provide aid (Costa, Campos, and Bandeira, 2012).

2.2.2.1. External Challenges

This section contains the challenges that come from outside the organization and directly affect the humanitarian supply chain as mentioned in previous studies.

2.2.2.1.1. Warehouse Challenges

The need for readiness is highlighted as the humanitarian supply chain gets increasingly complex. The ideal method of disaster relief preparation for optimizing the efficiency of humanitarian supply chains is to buy pre-positioned warehouse stock in advance. However, very few studies have examined how pre-positioning warehouses for humanitarian organizations might exploit the multi-criteria site problem from a business perspective (Roh, Jang, and Han, 2013). The issue of determining the best location for it within the firm has been cited by warehouse searchers as one of the major difficulties. According to research by Baporikar and Shangheta (2018), the criteria for the evolving hierarchical analytical model produced must take into account the key crucial elements for the selection of humanitarian relief storage sites.

Researchers contend that while selecting a warehouse for the humanitarian supply chain, the most crucial considerations are location, affordability, national stability, and logistical possibilities. According to Dascioglu, Vayvay, and Kalender (2019), some studies have examined and defined the crucial criteria for placing humanitarian supply chain warehouses using the multi-criteria decision-making method.

Resources are kept in a warehouse until they are dispersed to end users or until a responsible party in the chain decides how to use the resources (Balcik and Beamon 2008). The main goal of building storage or warehousing facility is to arrange the management and protection of humanitarian commodities until they are distributed to recipients. (Balcik and Beamon 2008) Reserve supplies for upcoming or unforeseen requirements must also be considered while planning humanitarian storage. Humanitarian organizations that purchase aid in advance of disasters strategically store or pre-position the aid at distribution centers. However, this model is only employed by a small number of humanitarian groups due to the lack of financing sources, the unpredictability of disaster occurrences, and the high operational expenses involved with administering distribution centers (Balcik et al. 2010). Various humanitarian supplies may be pre-positioned at the global, regional, or national level (see the diagram below). However, it might be challenging for humanitarian organizations to locate secure, reasonably priced,

undamaged local warehousing and storage facilities (Balcik et al. 2010). Storage facilities at airports and seaports are frequently used for this purpose.

2.2.2.1.2. Government Policies Challenges

International humanitarian efforts are significantly influenced by hosting nations. When one is willing to accept assistance, assistance can arrive at the proper time, whereas resistance to assistance can have detrimental effects. Understanding the impact of the host government on the logistical performance of international humanitarian organizations is essential because lives are in danger and there is little time to spend in humanitarian crises (Balcik et al., 2010). The attitude of government authorities' indifference is mostly to blame for the difficulties faced by international humanitarian organizations. There is uncertainty since their acts could go either way. For instance, the absence of customs procedures may result in quick clearing times, but these periods are occasionally prolonged by officers who are seeking bribes or who aren't showing up to work. Even if the host government tries to control interest tensions, it will be severely constrained by its limited organizational and operational skills, as was previously stated. In either scenario, host governments, or at the very least their agents may engage in opportunistic conduct by taking advantages (Dube, et. al., 2016).

The humanitarian supply chain may encounter challenges such high urgency, unpredictability, a lack of resources, and poor local infrastructure (Martinez, et. al., 2010). Humanitarian medical groups are the ones most impacted by arbitrary government actions, as a government stance on the refusal to allow in or delay in ordering medicines owing to customs difficulties may result in the loss of many lives. Yadav and Barve (2015) and various experts have determined that there are 12 essential success characteristics for a reliable, flexible supply chain for humanitarian aid. According to the authors, government policies and organizational structure are the primary element, and as a result, government cooperation with humanitarian organizations plays a vital role in ensuring a higher quality of life for the underprivileged.

2.2.2.1.3. Distribution and Fleet Management Challenges

Distribution involves the movement of supplies from hospitals or warehouses to the impacted areas. The provision of aid in the form of food, medication, shelters, and other resources for the injured or needy is handled via the humanitarian supply chain. Due to

the ambiguity in the post-disaster situation, efficient planning can achieve maximum aid distribution. Differential demand, facility and link damage, and a lack of resources are a few of the unknowns in post-disaster scenarios. To meet demand, lower unmet demand (unmet demand level), prevent deaths, and save the most lives, better relief distribution is necessary. A significant component of the research on relief distribution makes an effort to reduce the unmet need for better relief distribution (Safeer et al., 2014).

The difficulty of organizing transfers to transfer commodities from closed areas to disaster-prone areas is just one of the many difficulties facing the distribution or fleet management process in the humanitarian supply chain that have been revealed (Balcik and Beamon, 2008). In a case study on NRCS in Namibia that was detailed by Baporikar and Shangheta (2018), it was said that the specific issue was that NRCS had trouble explaining to persons affected by the tragedy how efficiently and effectively moving items may save lives. The NRCS also has trouble figuring out the preliminary needs because of a lack of mobility. Vehicles leave from warehouses to hospitals with a full load since sometimes the necessary requests frequently surpass the transport capacity that is readily available. The vehicles' overall trip duration must be cut down, and the effective use of resources considering vehicle and supply availability restrictions (Azmat and Kummer, 2019).

Both commercial and humanitarian commodities must be transported to their intended destinations (Balcik et al. 2010). In light of this, the Ethiopia Road Authority study stated that Ethiopia is one of the landlocked nations in Africa, requiring road transportation to transfer products and services from ports and throughout the nation. The need to move large quantities of supplies is a challenge for relief organizations due to damaged infrastructure, a lack of transportation capabilities, and other factors (Balcik et al. 2010).

Getting enough information about the current state of the roads presents another challenge for relief agencies. This is due to the possibility that in-country transportation support communication and information technologies may not be available (Balcik et al. 2010). A humanitarian transport plan must consider not just the mode of transportation but also the practical chances of delivering goods from one location to another as well as options for the quick, secure delivery of aid (Kinyua, 2013). In practice, there are difficulties with moving food from the port to the designated distribution locations, which could slow down the humanitarian response because of the delay in moving the supplies.

2.2.2.2. Internal Challenges

This section contains the challenges that come from within the organization and directly affect the humanitarian supply chain as mentioned in previous studies.

2.2.2.2.1. Qualified Staff Challenges

Because users of these tools may not know how to use them appropriately, having the right equipment for the job does not guarantee that the work will be completed correctly. The lack of qualified people, which results in a loss of money and time, is one of the major issues most humanitarian organizations face. The coordination hurdles between the various actors involved in the relief process are ultimately caused by the fact that many individuals involved in the relief process carry with them various structures, cultures, roles, and mandates (Kabra and Ramesh, 2015). In most NGOs or other humanitarian organizations, the individuals in charge of logistics and humanitarian supply chain management are frequently not experts in this subject, claim John, Gurumurthy, Soni, and Jain (2018). Consequently, they are not experts in problem-solving tools that May occur during operations.

2.2.2.2.2. Transparency Challenges

Nearly 15 years ago, the idea of supply chain transparency was unheard of, but today, middle and senior level managers from a variety of businesses, industries, and humanitarian aid organizations are interested in it (Bateman and Bonanni, 2019). Transparency in the supply chain is typically easier said than done. Gaining insight into the organization's humanitarian supply chains is a crucial undertaking that necessitates collaboration amongst several stakeholders in order to succeed. This becomes more challenging in a multifaceted, quick-paced setting (Tsai, 2019).

Transparency in the distribution of supplies and help has significant risks that could endanger organizations' ability to operate under the intense scrutiny and donor-imposed guidelines (Baporikar and Shangheta, 2018). Particularly in nations where corruption is a problem, commitment alone and assuring employee fairness may occasionally be sufficient. Price-fixing and inefficient transportation options might make meeting requests more challenging, and the organization may be required to pay bribes in order to fulfill its objective (Dufour, Laporte, Paquette and Rancourt, 2018).

2.2.3. Humanitarian Supply Chain Performance

The goals of a humanitarian organization are to provide supplies and aid to catastrophe victims, including food, water, medicine, and other necessities. According to Beamon and Balcik (2008), the humanitarian supply chain's performance must be effective and efficient to meet the needs of victims and other beneficiaries while also inspiring funders to support the initiatives. Performance measurement was defined by Haavisto and Goentzel (2015) as a method for gathering pertinent data and analyzing it to determine whether an organization's performance is in line with its operational strategy and established standards. Additionally, performance measurement is a technique that is used in every business to quantify operational results, measure performance, and provide feedback on the final product of the complete process.

A performance measurement is a technique developed to assess the efficacy and efficiency of an organization while working in any context, according to Balcik and Beamon (2008) and Kovács and Spens (2007). While efficiency measures how economically resources are used when giving humanitarian help, effectiveness measures the extent to which organizational goals are attained in terms of providing aid. The authors state that response time, service quality, technological efficiency, and cost effectiveness are the benchmarks for judging the performance of humanitarian organizations.

Effective performance measurement is crucial for humanitarian organizations, according to Balcik and Beamon (2008), who noted that it improves performance, holds managers accountable, and aids in decision-making. Effective performance measurement also enables leaders and staff to be inspired to contribute to the success of the organizations by providing feedback on how well those humanitarian organizations are performing. As a result, since performance measurements have an impact on the organization's strategic, tactical, operational, and control levels, they are crucial. Additionally, performance metrics help in formulating future plans and activities in addition to setting objectives and evaluating success.

When faced with several supply chain obstacles, humanitarian organizations may perform poorly and create a negative reputationf if the issues are not properly identified. One of the difficulties that can have a significant impact on an organization's performance and lead to the organization suspending operations is a challenge in the humanitarian supply chain. In

conclusion, supply chain management issues in a humanitarian setting may prevent humanitarian organizations from providing beneficiaries with the necessary supplies in accordance with the six rights of a supply chain, namely the right place, right product, right quality, right time, right cost, and right delivery (Kinyua, 2013).

2.3. Empirical Literature Review

According to a review of the literature, most research on the variables influencing the effectiveness of humanitarian supply chain management in disaster relief operations has been done in developed nations because those nations have access to more resources than developing nations like Ethiopia.

2.3.1. Global Empirical Literatures

The difficulties in managing the humanitarian supply system in Iraq were examined by Alani (2020). This investigation was conducted to identify the issues that have the greatest bearing on the HSC's ability to save lives in Iraq. There have been numerous studies on the HSC throughout different nations, particularly in the area of the obstacles it faces, and it appears that these challenges are of a similar nature. Due to the exploratory or investigative nature of the research, the practical side used both qualitative and quantitative research methods. It also included an in-depth interview with managers to understand the challenges generally, followed by a questionnaire that was distributed to all HSC workers in Iraq to understand their perspectives and to know the most prominent challenges. The questionnaire, which was sent to 36 individuals from various Iraqi organizations, revealed six main obstacles that were thought to have the greatest impact on the humanitarian supply chain. Due to the distance and the Corona pandemic, it was difficult for the study to collect the necessary samples, but this was overcome by using a video chat in the in-depth interview approach and the Internet to send the questionnaire to the relevant authorities.

Six fundamental responses to the questionnaire were identified through analysis as the issues that influence the humanitarian supply chain in Iraq the most. In the chapter on literature reviews, the researcher further divided the difficulties into internal and external challenges. The first issue is the buildup of urgent cases as a result of programs' lack of preparation for the procurement plan, which is regarded as an internal issue and can be seen as a specific instance in the humanitarian supply chain in Iraq. According to certain academics, like

Costa, Campos, and Bandeira (2012), Yadav and Barve (2015), and Kabra and Ramesh (2016), the second difficulty was the lack of cooperation between companies, which is an external challenge. The third challenge is the loss of suppliers due to delay in payment transactions by the Finance Department, which is an internal challenge unique to humanitarian organizations in Iraq. The fourth challenge is that the weak banking system is a significant challenge to the humanitarian supply chain in Iraq. The fifth challenge is the difficulty of dealing with suppliers during the payment process, which is another internal challenge related to the organization's finances. The sixth challenge is the lack of specialized suppliers, and it represents the last external challenge.

Korpela and Tuominen (1996) identified the logistics as being one of the most important success factors. Reliability, lead time, adaptability, cost effectiveness, and value addition are five essential success elements. Moreover 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).

2.3.2. Regional Empirical Literatures

Nyamu (2012) studied the impact of supply chain management challenges on humanitarian organizations in Kenya. The study was carried out to ascertain the impact of supply chain management challenges facing humanitarian organizations in Kenya. The study had two objectives: To establish the challenges facing humanitarian supply chain management 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 survey of 40 humanitarian organizations was conducted. Data was successfully collected from 40 supply chain managers, analysed using SPSS and presented using frequencies, percentages and mean scores in the form of tables and graphs. In order to determine the primary difficulties facing Kenya's humanitarian supply chain management, factor analysis was also done. According to the study's findings, the main obstacles to

humanitarian supply chain management include: a lack of understanding of the role that supply chain management plays in humanitarian operations, delays brought on by domestic obstacles, demand uncertainty, difficulties reaching the affected population due to insufficient transportation options, high costs that make it difficult to access the affected areas, and a failure to predict disasters. The effects of supply chain issues on the effectiveness of humanitarian organizations include, among other things, a delay in the delivery of the appropriate goods, a lack of information integration, and demand uncertainty. The study was constrained by factors like insufficient funding and time to hire the staff needed for data collection, as well as delays caused by respondents that pushed back the deadline for finishing the project.

2.3.3. Local Empirical Literatures

Amenu (2018) evaluated the impact of World Food Programme performance difficulties on the humanitarian supply chain. The study's objective was to evaluate the difficulties in managing the humanitarian supply chain in WFP Ethiopia. The study used a descriptive research design and entailed the gathering of primary data using a questionnaire survey. The questionnaire's contents were divided into two categories: (1) the respondent's profile; and (2) the difficulties in managing the humanitarian supply chain, which were measured using Likert scales. Concerning issues with the humanitarian supply chain, the questionnaire concentrated on issues with insufficient coordination, information and communications integration, inadequate transport capacity, port congestions, custom clearance, and insufficient warehousing. Along with the questionnaire study, key informant interviews with senior management staff from the NDRMC and WFP Ethiopia were conducted. Additionally, secondary data on pertinent objects was gathered. According to the study results, WFP Ethiopia was having the biggest supply chain issues due to an insufficient quantity and capacity of warehouses. The rating of the warehouse challenge was followed by issues with coordination and a shortage of transportation facilities. The key informant interviews yielded similar results, with the majority of the participants acknowledging the existence of a number of interconnected difficulties in the supply chain management of WFP Ethiopia. It is advised that, in order to improve supply chain management, focus should be placed on warehouse, transportation, and coordination management of the organization.

Wodaje (2019) conducted research on the procedures, difficulties, and effectiveness of Plan International Ethiopia's humanitarian logistics management. The major goal of this study

was to evaluate the procedures, difficulties, and accomplishments of a chosen non-profit international organization, Plan International Ethiopia, in an effort to advance the field of research. The primary research methodology used for the study was a descriptive research methodology. The information was gathered through a questionnaire that was given to 100 staff members and partners from the Guji and Gedio zones, where there were numerous internal displacements that necessitated the use of emergency measures from organizations like Plan International Ethiopia. Only 80 of the 100 issued questionnaires were used for the study because the other 20 either weren't returned at all or were rejected for being incomplete. The acquired data were analysed using the statistical package SPSS, and descriptive texts, frequency tables, cross tabulations, percentiles, means, and standard deviations were used to display the results.

Plan International Ethiopia carefully evaluates situations before sending emergency supplies, and its team and the procurement activity are also fairly effectively handled, according to the assessment of humanitarian logistics standards. Using both own fleet and third-party partners, the transportation of supplies is also performing satisfactorily, notwithstanding certain reservations expressed in the comments for certain areas of transport. Supply distribution and storage were deemed to be good with a few caveats. The effectiveness of Plan International Ethiopia's humanitarian logistics practices is challenged by both internal and external factors, with a lack of appropriate technology, external factor-related insecurity, and disorganized processes and procedures being mentioned as the main factors affecting the organization's performances. In general, Plan International Ethiopia is doing well in the aforementioned affected areas, and its operations are seen as being quite effectively managed. The issues should be carefully considered and dealt with by the organization for those that are under its control, while discussions with partners and the relevant governmental bodies are necessary for those that are out of its control. Flexibility is essential when demand fluctuates in both volume and variety; therefore, the business must implement a contingency plan if flexibility is thought to be underperforming. It is a good idea to take into account more organizations as a future route for academics that are interested in this topic, particularly to generalize on the external obstacles that affect their performances.

Yigezu (2016) studied the challenges of humanitarian supply chain management in the case of National Disaster Risk Management Commission of Ethiopia. The study was conducted

to assess the challenges of humanitarian supply chain management in Ethiopia. Specifically, the study had aimed at assessing the supply chain management practices of humanitarian organizations, identifying supply chain challenges facing humanitarian organization in emergencies and identifying supply chain practices that can be adopted to overcome the challenges and evaluate the effectiveness of national disaster risk management commission response rate in terms of timeliness, suitability and adequacy of relief quantities. The information was gathered from early warning experts, supply chain logistics and warehousing professionals, experts from the *Oromiya* area, the East Shewa zonal, and the *Adama* district, as well as *Adama woreda* aid recipients. The purposeful selection of the communities of *EJeers Mersa, Bekoje Dewaro, and Chekawa dufa* in *Adama* district allows us to examine how the disaster risk management commission managed the management of disasters in the area of humanitarian supply chain in response to the 2015–16 disaster. Additionally, households from each community's aid beneficiaries were chosen at random to participate in the survey. The study was carried out with the use of the Statistic Package for Social Science (SPSS), and the results were presented using frequency and percentage tables, Likert scales, mean scores, standard deviations, and descriptive statistics. According to the findings, the problems affecting humanitarian organizations can be divided into three categories: management-related problems, financial-related problems, and problems connected to the working environment. It was fascinating to learn that recipients were happy with the emergency response rate for 2015-16 in terms of promptness, sufficiency, and suitability of relief item delivery. The study's findings present a straightforward framework for supply chain management strategies for managing disasters during relief operations and explore the benefits of their application for governments and other humanitarian organizations.

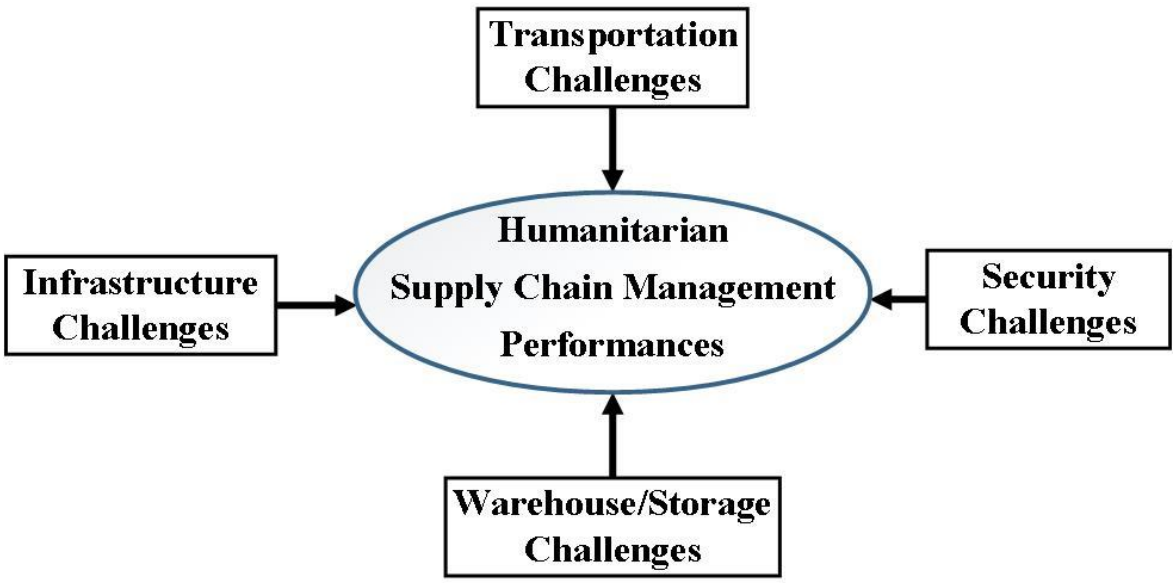
2.4. Conceptual Framework of the Study

Supply chain management problems have an impact on the efficacy and efficiency of humanitarian organizations. Researchers in the field of humanitarian supply chain management have identified numerous challenges that affect how effective humanitarian organizations are. This study assessed the challenges WFP Ethiopia had in managing its supply chain as it provided aid and addressed the humanitarian crisis in the nation.

Numerous factors, such as the time it takes to respond to catastrophes and operational costs, have an impact on the operations and performance of humanitarian organizations. The accompanying image illustrates some of the challenges that may affect the supply chain management operations of humanitarian organizations in the domains of the issue under consideration.

However, due to time and resource limitations, the following supply chain management issues for humanitarians were chosen for the study. These issues related to infrastructure quality and accessibility, transportation and accessibility, security, and warehouse/storage facilities.

Figure 1: Conceptual Framework of the Study



Source: Researcher's Development based on Literatures

CHAPTER 3: RESEARCH METHODOLOGY

This section elaborates in detail the research design & approach, samples, sampling frame & sampling technique, data type & sources, data collection instrument, methods and tools of data analysis, and ethical considerations.

3.1. Research Design

An empirical research project's data gathering strategy is outlined in the research design. It serves as a "blueprint" for conducting empirical studies that are intended to address certain research issues or test particular theories (Anol, 2012). The type and method of data collection, the information source, the sampling strategy, and the time and cost restrictions are all explained and justified (Saunders, 2012). The research methodology can be categorized in a number of ways, including data collection techniques, timelines, researcher involvement, and study objectives (Blumberg, 2008).

In this study, a descriptive survey research design was used. This is so that, in accordance with (Lavrakas, 2008), descriptive research designs can generate a thorough quantitative account of phenomena while also identifying components and their interactions. In order to develop a complete quantitative description of the infrastructure, transport, security, and storage difficulties in WFP, this study aims to provide answers to the research questions about the current status of employees' perspectives and attitudes about the humanitarian supply chain challenges.

Since correlational research describes and evaluates the magnitude and degree of an existing relationship between two or more continuous quantitative variables with interval or ratio types of measurements or discrete variables with ordinal or nominal type of measurements, Lavrakas (2008) claimed that correlational research is a type of descriptive research. Correlational research thus entails gathering information from a sample of people or things in order to assess the strength of links between two or more variables in order to potentially build predictions on these associations. Depending on the data metric for each of the variables, there are numerous ways to calculate a correlation coefficient.

3.2. Research Approach

Each of the three types of research approaches (i.e., quantitative, qualitative and mixed) mentioned in the research technique depends on the researcher's preferred method of conducting the study in question (Creswell, 2013). According to Creswell (2013), when choosing between the three ways, a researcher should consider the following factors: the research problem, the researcher's own experiences, and the audience for whom the research report is being produced.

According to Creswell (2009), a quantitative approach is one in which the investigatory primarily uses postpositive claims for gaining knowledge (i.e., cause-and-effect thinking, reduction to particular variables, hypotheses, and questions, use of measurement and observation, and theory testing). The development and application of mathematical ideas, models, and hypotheses relating to natural events is the goal of quantitative research. To reach a result that can be applied broadly, it lays a larger emphasis on the numerical data and statistical test (Saunders, 2012). Although quantitative research is criticized for arbitrary variable definitions outside of context settings and failing to create hypotheses from the data (Silverman, 2006), a mixed research approach will be used to attain this research purpose.

In order to demonstrate the efforts made in the humanitarian supply chain during disaster relief efforts, identify the key factors (challenges) that have an impact on the performance of the humanitarian supply chain management, and recommend solutions for effectively preventing and responding to disasters, a mixed research approach combining qualitative and quantitative research methods were used in this study. The research entails more than just gathering and analyzing both types of data; it also uses both methodologies concurrently to increase the study's overall robustness.

3.3. Population of the Study

The target population of this study was employees of WFP working in logistics & supply chain areas of WFP at Addis Ababa and outlying Sub-Offices (Internal Report of WFP, 2023).

3.4. Sampling and Sampling Technique

Non-probability purposive (judgmental) sampling technique was used in this research to select sample staff respondents from Addis Ababa and outlying Sub-Offices (*Amhara, Afar, Tigray,*

Somali, Gambela & Benishangul). Lavrakaz (2008) states that a purposive sample, also referred to as a judgmental or expert sample, is a type of non-probability sample. The main objective of a purposive sample is to produce a sample that can be logically assumed to be representative of the population. Hence, 503 employees working in logistical & supply chain areas of WFP was considered as optimal sample size.

3.5. Sources of Data

Data collected through a field survey of WFP staff working in Addis Ababa and outlying Sub-Offices. In conducting this study, the researcher basically made use of primary data types for making analysis & interpretation of the study results. Primary data was collected through self-administered five point Likert-scale (Likert, 1932) questionnaire filled by the existing employees of WFP. In addition, reliable secondary data also collected from different documents obtained from review of related literatures, previous research, published journals, internal records of the organization, website (internet), relevant books, articles and other available sources.

3.6. Data Collection Instrument

The data collection instrument used in this study was close-ended five Point Likert-scale questionnaires to determine the perception of employees towards WFP supply chain management challenges. The questionnaire consisted of two parts. The first part was the demographic profile which helped the researcher to identify the participants' gender, age, educational background and work experience. The second part consisted of 36 items which helped the researcher to investigate each determinant factor that reflects the perception level of employees towards WFP's supply chain management challenges.

A five-point Likert scale was used to create the questions (Likert, 1932). Respondents were asked to rate how much they agreed or disagreed with each of the questions. This methodological tool is used by many researchers since replies from such a scale are likely to be accurate and reasonably simple for respondents to use (Balzan and Baldacchino, 2007; Lam & Kolic, 2008). To swiftly reach the respondents and gather the information in an effective manner, the questionnaire was created using Google Form and delivered to them via the corporate website. After gathering the distributed questionnaires, the data was carefully edited and reviewed to remove any incomplete questions and to ensure that only valid questionnaires were taken into consideration for analysis. The data were then loaded into the SPSS program

for analysis. The results of the investigation are then presented using various statistical methods and models.

3.7. Methods of Data Analysis and Tools

The Statistical Package for Social Science (SPSS) software package, version 26, was used to analyze and present the study's results. To summarize and describe participant responses, each response from the respondents was coded, entered into the program, and subjected to descriptive statistical analysis utilizing methods including frequency, percentage, mean, and standard deviation. From inferential statistics, Principal Component analytical (PCA) was used as inferential statistics while extracting the major humanitarian supply chain challenges through reducing the dimensionality of large data sets and transforming a large set of variables into a smaller one that still contains most of the information in the large set.

3.8. Validity and Reliability

3.1.1. Validity

The degree to which a measure faithfully reflects what it is intended to measure is known as validity. It is concerned with how accurately the measure defines the concept. Because of this, this study addresses validity through a review of pertinent literatures and advisor's consultation.

3.1.2. Reliability

Utilizing Cronbach's Alpha (α) values, the researcher ran a reliability test to assess the consistency of the study measurement for each construct item. Consistency plays a key role in reliability. Reliability estimates the consistency of the measurement or more simply, the degree to which an instrument measures the same way each time it is used under the same conditions with the same subjects. Reliability is essentially about consistency (John, 2007).

That is, we can state that our measurement device is trustworthy if we measure something repeatedly and the outcome is the same. If a measuring device yields repeatable data, it is considered dependable (Kothari, 2004). The most well-known and frequently applied method for estimating the internal consistency or reliability of tests and surveys in the behavioral sciences is the Cronbach's alpha coefficient (Kurata and Nam, 2010).

According to Duffy and Kilbourne (2001), Cronbach measures how consistently participants respond to questions on a scale. A high (higher than 0.70) suggests that the items on a scale are measuring the same construct, according to Duffy et al. (2001). When utilized in

fundamental social science research, Nunnally (1978) indicated that score dependability of 0.70 or greater is appropriate. We can draw a conclusion about the internal consistency based on the reliability analysis's findings. Cronbach's Alpha () was calculated prior to the analysis of the research to guarantee the consistency and reliability of the data instrument.

3.9. Ethical Considerations

There were certain ethical protocols to be followed by the researcher. The first was asking explicit consent from the respondents. This ensured that their participation to the study was not out of their own desire. The researcher ensured that the respondents were aware of the objectives of the research and their contribution to its completion. One other ethical measure that was exercised by the researcher was treating the respondents with respect and courtesy. Following the above ethical considerations, the researcher motivated and initiated the respondents to be at ease and more likely to give honest responses to the items of the questionnaire. There were also ethical measures taken in the data analysis. To ensure the integrity of the data, the researcher checked the accuracy of encoding for the survey responses. This was carried out to ensure that the statistics generated from the study would be truthful and verifiable.

CHAPTER 4: RESULTS AND DISCUSSIONS

This chapter deals with data presentation, analysis as well as interpretation of the data collected using questionnaire. From descriptive statistics data analysis techniques like frequency, percentage, mean, SD were used and from inferential statistics factor analysis technique was used to describe and analyze the collected data with the help of SPSS software package.

4.1. Questionnaire Response Rate

Nearly 503 respondents were sought for the study, and 452 valid questionnaires were returned for examination. As a result, the study's response rate was close to 90%. Therefore, table 1 below shows the study's response rate.

Table 1: Response Rate of the Study

Response Validity	Frequency	Percentage
Collected/Valid	452	90
Uncollected	51	10
Total	503	100

Source: Researcher's Survey Output (2023)

4.2. Demographic Profile of the Respondents

The information gathered on the respondents' demographic make-up is presented in this section. Gender, age, educational background, employment experience with the WFP, and experience with other humanitarian and non-humanitarian organizations were the demographic data of the respondents' collected for this study.is seen in the following Table 2.

294 (65%) of the survey's total respondents were men, and 158 (35%), women. This suggests that both sexes participated in the research objectively and that there was no gender bias in the study's conclusions (see Table 2).

According to the frequency table results, 64 (14.2%) of the respondents are between the ages of 25 and 34, 125 (27.7%) are between the ages of 35 and 44, 189 (41.8%) are between the ages of 45 and 54, and 74 (16.4%) are between the ages of 55 and 64. The findings

demonstrated that various age groups were fairly represented in the study even though the bulk of respondents were between the ages of 45 and 54.

Regarding their level of education, 20 (4.4%) of them were college diploma holders, 193 (42.7%) of them were first degree holders, and the remaining 239 (52.9%) were second degree and above. This indicated that the majority of the respondents can easily comprehend and fill out the questionnaires.

Concerning work experience, 51 (11.3%) of them had below 5 years of work experience, 53 (11.7%) of them had work experience between 5-10 years, 189 (41.8%) of them had between 10-15 years of work experience and 159 (35.2%) had over 15 years of work experience. The result indicated that most of the respondents were at their senior stage of their career. Similarly, the majority of sample respondents had over 15 years of work experience in other humanitarian/non-humanitarian organizations.

Concerning their current position in their organization, 31 (6.9%) of them were Supply chain Officer/Coordinator/Manager, 96 (21.2%) of them were Logistic Officer, 42 (9.3%) of them were Procurement Associate, 21 (4.6%) were Food technologist/Quality control expert, 240 (53.1%), Logistics Associate and the remaining, 22 (4.9%), were Warehouse Operator.

Table 2: Demographic Profile of the Respondents

Type	Demographic Profile Description	Frequency	Percent
Gender	Male	294	65.0
	Female	158	35.0
	Total	452	100.0
Age	25-34 Years	64	14.2
	35-44 Years	125	27.7
	45-54 Years	189	41.8
	55-64 Years	74	16.4
	Total	452	100.0
Educational Background	College Diploma	20	4.4
	First Degree	193	42.7
	Second Degree and above	239	52.9
	Total	452	100.0
	Below 5Years	51	11.3
Work Experience in your Organization (WFP)	5-10 Years	53	11.7
	10-15 Years	189	41.8
	Over 15 Years	159	35.2
	Total	452	100.0
	Under 5Years	125	27.7

Type	Demographic Profile Description	Frequency	Percent
Years of experience in other humanitarian/non-humanitarian organizations	5-10 Years	108	23.9
	10-15 Years	32	7.1
	Over 15 Years	187	41.4
	Total	452	100.0

Source: Researcher's Analysis from the SPSS Package Output (2023)

4.3. Descriptive Statistics of the Humanitarian Supply Chain Challenges

This section of the study presented in detail the descriptive statistical results (mean and standard deviation) of each item included under each humanitarian supply chain challenges (i.e. Infrastructure, Transport, Security and Storage).

For the mean values, the decision rule (cut-off point) was decided and interpreted using credible sources contributed by Creswel (2012). According to Creswel (2012), mean value of ≥4.5=Very High, 3.51-4.51=High, 2.51-3.5= Moderate, 1.51-2.5=Low; < 1.5=Very Low. Based on this mean score measurement, the researcher described the mean score of the participants for each category of humanitarian supply chain challenges descriptions.

4.3.1. Descriptive Statistics on Infrastructure Challenges

Table 3: Descriptive Statistics Result on Infrastructure Challenges

Descriptive Statistics			
	N	Mean (M)	Std. Deviation (SD)
Due to lack of the existence of accessible roads to get to places where emergency food is required becomes so difficult for on time assistance of the disaster-affected people.	452	4.15	.705
With no regular maintenance of degraded/washed away, damaged roads and bridges it is so difficult to reach out beneficiaries and meet their needs, i.e. What is happening in most of the war zones, and heavy rains registered.	452	4.22	.732
No action is taken by local and regional administration towards maintaining the existing roads and creating access establishing feeder roads whereby beneficiaries would be reached out	452	3.27	1.027
Due to the type of trucks which are not compatible with the road across the country (Ethiopia), it affects timely assistance of beneficiaries affected by man-made or natural calamity.	452	3.48	.766
The non-existence of adequate infrastructure hindering the adoption of all types of mode of transport and causes an influence to take an advantage of each type to deliver humanitarian food aid in a timely fashion	452	4.02	.630
Majority of the Ethiopian roads which goes to places where drought affected people are found are not all weather roads which ultimately impeding the humanitarian aid operation not to properly serve the purpose.	452	3.72	.628
Because of poor quality of road construction most of the Ethiopian roads are damaged and washed away by flood which in effect the supply chain process is highly affected	452	3.71	1.065

Descriptive Statistics			
	N	Mean (M)	Std. Deviation (SD)
The overly usage of main roads which connects Ethiopia with the neighboring corridors, in particular trucks overloaded than the standard of the country allowed by ministry of transport causes a negative impact on the incoming consignment of humanitarian aid which in effect affects the drought affected community.	452	3.79	.640
Valid N (listwise)	452		

Source: Researcher's Analysis from the SPSS Package Output (2023)

The mean value (Mean=4.15 & SD=0.705) showed that the respondents highly agreed that Due to lack of the existence of accessible roads to get to places where emergency food is required becomes so difficult for on time assistance of the disaster-affected people. They also highly agreed that with no regular maintenance of degraded/washed away, damaged roads and bridges it is so difficult to reach out beneficiaries and meet their needs (Mean=4.22 & SD=0.732), the non-existence of adequate infrastructure hindering the adoption of all types of mode of transport and causes an influence to take an advantage of each type to deliver humanitarian food aid in a timely fashion

The respondents also highly agreed that majority of the Ethiopian roads which goes to places where drought affected people are found are not all weather roads which ultimately impeding the humanitarian aid operation not to properly serve the purpose (Mean=3.72 & SD=0.628), because of poor quality of road construction most of the Ethiopian roads are damaged and washed away by flood which in effect the supply chain process is highly affected (Mean=3.71 & SD=1.065), the overly usage of main roads which connects Ethiopia with the neighboring corridors, in particular trucks overloaded than the standard of the country allowed by ministry of transport causes a negative impact on the incoming consignment of humanitarian aid which in effect affects the drought affected community (Mean=3.79 & SD=0.640).

On the other hand, the respondents moderately agreed that no action is taken by local and regional administration towards maintaining the existing roads and creating access establishing feeder roads whereby beneficiaries would be reached out (Mean=3.27 & SD=1.027) and due to the type of trucks which are not compatible with the road across the country (Ethiopia), it affected timely assistance of beneficiaries affected by man-made or natural calamity out (Mean=3.48 & SD=0.766).

4.3.2. Descriptive Statistics on Transport Challenges

Table 4: Descriptive Statistics Result on Transport Challenges

Descriptive Statistics			
	N	Mean	Std. Deviation
Insufficiency of inland & overland trucks in the country (Ethiopia) causes imperfection to the humanitarian aid supply chain in terms of uplifting aid cargo from the neighboring corridors and WFP hubs to places where the emergency food is required.	441	3.81	.675
Despite the inefficiency of trucks obtainable in the country (Ethiopia) there is also a cases when most of the commercial fleets commandeered by various forces to frontlines which in the end highly affect the humanitarian supply chain.	452	4.10	.565
Majority of truck owners, associations and PLCs engaged in inland & overland transport business are not stirred to increase the size of their transport business, number of trucks they have at present due to various factors such as, shortage of foreign currency, and also price of trucks is skyrocketing as a results of inflation, wear & tear (Lubricant, tire & spare parts) cost.	452	4.17	.780
Lack of coordination among various stakeholders such as government, WFP, and other NGOs (non-government organization) make the overland trucks scarcely available. For instance, Government and WFP aid cargo comes at the same time where it demands huge number of trucks but, it is not possible to position that many of trucks and eventually WFP happen to shunt the bulk cargo to silos situated near by the port and leased warehouses.	452	4.16	.569
The down time of trucks due to breakdown and maintenance escalates the shortage of overland and inland transport that in effect the humanitarian food aid supply chain is negatively impacted.	452	3.92	.672
The availability of trucks in the country (Ethiopia) and the amount of aid cargo is not matching and in the end the proper flow of humanitarian supply chain is affected which is to mean emergency food is getting late to reach beneficiaries.	452	3.73	1.003
As most of the Ethiopian trucks are old in their models, it Lags the turnaround time of origin-destination that eventually affect truckers to timely position trucks in a timely manner.	452	3.88	.848
B/c the transport tracking management is very poor, transport companies are not able to trace the whereabout of each truck which is highly affecting the individual trucks effectiveness and Efficiency. The new start of adopting modern technology like using of GPS whereby it will be possible to trace the location of each truck is highly advisable.	452	4.20	.671
To bring about far reaching change in the transport sector of the country (Ethiopia) whereby fast action is to be implemented in terms of reaching out any of the disaster area, a holistic approach is highly recommended by all entities regarded as the humanitarian supply chain actor.	452	4.01	.782
Factors that hindering availability of sufficient overland-inland transport is the loading – offloading at the origin and destination point. For example, delay and trucks stranded for long in loading from any of WFP hubs to every destination points where beneficiaries are waiting for emergency assistance.	452	3.51	.728
Valid N (listwise)	441		

Source: Researcher's Analysis from the SPSS Package Output (2023)

Regarding transport challenges, the respondents also highly agreed that insufficiency of inland & overland trucks in the country (Ethiopia) causes imperfection to the humanitarian aid supply chain in terms of uplifting aid cargo from the neighbouring corridors and WFP hubs to places where the emergency food is required (Mean=3.81 & SD=0.675), despite the inefficiency of trucks obtainable in the country (Ethiopia) there is also a cases when most of the commercial fleets commandeered by various forces to frontlines which in the end highly

affect the humanitarian supply chain (Mean=4.10 & SD=0.565), majority of truck owners, associations and PLCs engaged in inland & overland transport business are not stirred to increase the size of their transport business, number of trucks they have at present due to various factors such as, shortage of foreign currency, and also price of trucks is skyrocketing as a results of inflation, wear & tear (Lubricant, tire & spare parts) cost (Mean=4.17 & SD=0.780).

The respondents also highly agreed that lack of coordination among various stakeholders such as government, WFP, and other NGOs (non-government organization) make the overland trucks scarcely available. For instance, Government and WFP aid cargo comes at the same time where it demands huge number of trucks but, it is not possible to position that many of trucks and eventually WFP happen to shunt the bulk cargo to silos situated near by the port and leased warehouses (Mean=4.16 & SD=0.569), the down time of trucks due to breakdown and maintenance escalates the shortage of overland and inland transport that in effect the humanitarian food aid supply chain is negatively impacted (Mean=3.92 & SD=0.672).

Respondents also highly agreed that the availability of trucks in the country (Ethiopia) and the amount of aid cargo is not matching and in the end the proper flow of humanitarian supply chain is affected which is to mean emergency food is getting late to reach beneficiaries (Mean=3.73 & SD=1.003), as most of the Ethiopian trucks are old in their models, it Lags the turnaround time of origin-destination that eventually affect truckers to timely position trucks in a timely manner (Mean=3.88 & SD=0.848), because the transport tracking management is very poor, transport companies are not able to trace the whereabouts of each truck which is highly affecting the individual trucks effectiveness and Efficiency. The new start of adopting modern technology like using of GPS whereby it will be possible to trace the location of each truck is highly advisable (Mean=4.20 & SD=0.671).

They also highly agreed that to bring about far reaching change in the transport sector of the country (Ethiopia) whereby fast action is to be implemented in terms of reaching out any of the disaster area, a holistic approach is highly recommended by all entities regarded as the humanitarian supply chain actor (Mean=4.01 & SD=0.782) and factors that hindering availability of sufficient overland-inland transport is the loading- offloading at the origin and destination point. For example, delay and trucks stranded for long in loading from any

of WFP hubs to every destination points where beneficiaries are waiting for emergency assistance (Mean=3.51 & SD=0.728).

4.3.3. Descriptive Statistics on Security Challenges

Table 5: Descriptive Statistics Result on Security Challenges

Descriptive Statistics			
	N	Mean	Std. Deviation
Security is one of the enabling factors for the successful flow of humanitarian food aid supply chain from the origin till the aid gets to the end point where the people affected by manmade or natural disaster are found.	452	4.31	.673
In the absence of peace and stability while moving humanitarian cargo there is a case where miss use of the food being diverted for wrong purpose and escalates the human suffering.	452	4.47	.542
In the case of manmade disaster (fighting between two or more groups) there is always an occurrence that, the humanitarian food aid supply chain is blocked somewhere in its way to the needy people for unlimited time and the food gets infested due to hot weather, which in the end causes incurring huge costs for the treatment the infested commodity.	452	3.98	.726
Within a situation which is unsecured like that of the recent one between federal and Tigray regional state, the humanitarian food severely diverted(misappropriated) in between the origin point and at the destination point by unethical group of community. i.e., this incident recurrently happened alongside of the road in Semera administration the food was transported from Adama WFP hub to Mekelle to assist the war affected people the same is also true in the final destination.	452	3.78	.705
Despite the in secured situation when the Federal and Tigray regional government fought each other WFP has faced a big challenge to move lifesaving commodity to the war affected people in Tigray region, i.e., more than 200 trucks were stacked in Semera for more than a month holding food assistance for which reason WFP incurs huge demurrage.	452	3.88	.861
Due to in secured situations in Tigray region, the cost of transport become tremendously high associated with various running cost increase, i.e. Fuel, spare parts and lubricants as a result of the war and which eventually become challenging for humanitarian aid supply chain.	452	3.89	.314
Due to unsecured situation occurred in Ethiopia some unprincipled truck drivers have been caught red handed while trying to smuggle non aid commodity together with the aid food that causes lengthy time delayed until investigation is over	452	3.58	.495
Whilst transporting food through the unsecured situation consolidating trucks in a convoy method is minimizing the risk of being looted and magnify visibility that the food is transported for lifesaving purpose.	442	4.08	.591
The humanitarian food aid operation in unsecured situation like that of what happened between the Federal and Tigray opposition creates a big loophole in terms of food diversion and misappropriation.	452	4.18	.658
Due to insecurity, trucks passing through war zones like Semera, Serdo and beyond there was an incident of trucks overturning and fire outbreak that causes the aid food and non-food items damaged which is said to be one of the humanitarian food aid drawback.	452	3.69	.600
Valid N (listwise)	442		

Source: Researcher's Analysis from the SPSS Package Output (2023)

Regarding security challenges, the respondents highly agreed that security is one of the enabling factors for the successful flow of humanitarian food aid supply chain from the

origin till the aid gets to the end point where the people affected by manmade or natural disaster are found (Mean=4.31& SD=0.673), in the absence of peace and stability while moving humanitarian cargo there is a case where miss use of the food being diverted for wrong purpose and escalates the human suffering (Mean=4.47 & SD=0.542), in the case of manmade disaster (fighting between two or more groups) there is always an occurrence that, the humanitarian food aid supply chain is blocked somewhere in its way to the needy people for unlimited time and the food gets infested due to hot weather, which in the end causes incurring huge costs for the treatment the infested commodity (Mean=3.98 & SD=0.726).

Within a situation which is unsecured like that of the recent one between federal and Tigray regional state, the humanitarian food severely diverted(misappropriated) in between the origin point and at the destination point by unethical group of community. i.e., this incident recurrently happened alongside of the road in Semera administration the food was transported from Adama WFP hub to Mekelle to assist the war affected people the same is also true in the final destination (Mean=3.78 & SD=0.705), despite the in secured situation when the Federal and Tigray regional government fought each other WFP has faced a big challenge to move lifesaving commodity to the war affected people in Tigray region, i.e., more than 200 trucks were stacked in Semera for more than a month holding food assistance for which reason WFP incurs huge demurrage (Mean=3.88 & SD=0.861).

Respondents also highly agreed that due to in secured situations in Tigray region, the cost of transport become tremendously high associated with various running cost increase, i.e. Fuel, spare parts and lubricants as a result of the war and which eventually become challenging for humanitarian aid supply chain (Mean=3.58 & SD=0.495), due to in secured situation occurred in Ethiopia some unprincipled truck drivers have been caught red handed while trying to smuggle non aid commodity together with the aid food that causes lengthy time delayed until investigation is over, whilst transporting food through the in secured situation consolidating trucks in a convoy method is minimizing the risk of being looted and magnify visibility that the food is transported for lifesaving purpose, the humanitarian food aid operation in unsecured situation like that of what happened between the Federal and Tigray opposition creates a big loophole in terms of food diversion and misappropriation and due to insecurity, trucks passing through war zones like Semera, Serdo and beyond there was an incident of trucks overturning and fire outbreak that causes the aid food and non-

food items damaged which is said to be one of the humanitarian food aid drawback (Mean=3.69 & SD=0.600).

4.3.4. Descriptive Statistics on Warehouse/Storage hallenges

Table 6: Descriptive Statistics Result on Warehouse/Storage Challenges

Descriptive Statistics			
	N	Mean	Std. Deviation
Mostly beneficiaries are forced to travel a long distance which takes them half day long to collect aid food as there is no any warehouse nearby the place where they are leaving place, which is also a big challenge for the humanitarian aid supply chain.	452	4.10	.701
Humanitarian organizations including WFP uses temporary warehouses (WiikHall and Rub Halls) in which emergency relief food is prepositioned even though it is not sufficiently available and still the scarcity is there.	452	4.03	.463
Temporary warehouses (wiikHalls) are temperature sensitive by its very nature and is not recommendable to keep aid food for longer period of time in it as far as the quality of food is concerned.	452	4.11	.759
Permanently constructed warehouses are by far suitable for any aid food in terms of safety and quality in which food would be stored long, but it is very rare that humanitarian agencies take the initiative in constructing permanent warehouse.	452	4.12	.696
Due to unavailability of warehouses distribution of food takes place direct from loading trucks which is time taking to release trucks back to the origin and in the end the humanitarian organization (WFP) incurring demurrage costs.	452	3.59	.898
Warehouse unavailability increases the lead-time of each truck as distribution is directly taking place from each truck.	452	3.36	.960
Warehouse management practice is not possible in emergency response places where food is placed in open places under the shade of temporary materials like canvases and plastic sheets.	452	3.33	1.078
Temporary warehouses optionally be constructed using local material and to be implemented as a temporary solution of emergency food storage.	452	3.96	.654
Valid N (listwise)	452		

Source: Researcher's Analysis from the SPSS Package Output (2023)

Regarding warehouse/storage challenges, the respondents highly agreed that most beneficiaries are forced to travel a long distance which takes them half day long to collect aid food as there is no any warehouse nearby the place where they are leaving place, which is also a big challenge for the humanitarian aid supply chain (Mean=4.10 & SD=0.701), humanitarian organizations including WFP uses temporary warehouses (WiikHall and Rub Halls) in which emergency relief food is prepositioned even though it is not sufficiently available and still the scarcity is there (Mean=4.03 & SD=0.463), temporary warehouses (wiikHalls) are temperature sensitive by its very nature and is not recommendable to keep aid food for longer period of time in it as far as the quality of food is concerned (Mean=4.11 & SD=0.759), permanently constructed warehouses are by far suitable for any aid food in terms of safety and quality in which food would be stored long, but it is very rare that

humanitarian agencies take the initiative in constructing permanent warehouse (Mean=4.12 & SD=0.696), due to unavailability of warehouses distribution of food takes place direct from loading trucks which is time taking to release trucks back to the origin and in the end the humanitarian organization (WFP) incurring demurrage costs (Mean=3.59 & SD=0.898) and temporary warehouses optionally be constructed using local material and to be implemented as a temporary solution of emergency food storage. (Mean=3.96 & SD=0.654).

On the other hand, the respondents moderately agreed that warehouse unavailability increases the lead-time of each truck as distribution is directly taking place from each truck (Mean=3.36 & SD=0.960) and warehouse management practice is not possible in emergency response places where food is placed in open places under the shade of temporary materials like canvases and plastic sheets (Mean=3.33 & SD=1.078)

4.4. Reliability Analysis

Then, as a measure of scale or instrument reliability or internal consistency, investigations frequently employ Cronbach's alpha. Alpha was first explored by Cronbach (1951), who opined that it was more practical to use the name rather than continuously referring to the "Kuder-Richardson Formula 20" (p.299)[1].

Table 7: Reliability Statistics Analysis

S.N	Variables/Constructs of the Study	Cronbach's Alpha Value	No. of Items
1	Infrastructure Challenges	0.696	8
2	Transport Challenges	0.762	10
3	Security Challenges	0.755	10
4	Storage Challenges	0.762	8
	Overall Reliability	**0.862**	**36**

Source: Researcher's Analysis from the SPSS Package Output (2023)

As presented in table 7, the Cronbach's alpha coefficients for infrastructure, transport, security and storage challenges were 0.696, 0.762, 0.755 & 0.762 respectively and their internal consistency were reliable since their reliability scale coefficients were above 0.70

[1] Taber, K. S. (2016). The Use of Cronbach' s Alpha When Developing and Reporting Research Instruments in Science Education.

and the overall internal consistency of the measures used in this study can also be taken as reliable (i.e. 0.862).

4.5. Inferential Statistics Analysis

Factor analysis mainly Principal Component was made to determine/extract the most important supply chain challenging factors affecting humanitarian food aid supplies at WFP.

4.5.1. Factor Analysis

This study has followed three major steps for conducting factor analysis: i) assessment of the suitability of the data, ii) factor extraction, and iii) factor rotation and interpretation.

4.5.1.1. Assessment of the Suitability of the Data

To analyze humanitarian food aid supply chain challenges, Kaiser-Meyer-Olkin is used to measure the suitability of data for factor analysis. Similarly, Bartlett's test of Sphericity, correlation matrix, and determinant score are computed to detect the appropriateness of the data set for functioning factor analysis (Pett et al., 2003).

Table 8 illustrates the value of KMO statistics is equal to 0.546 > 0.5 which indicates that sampling is adequate and the factor analysis is appropriate for the data. Bartlett's test of Sphericity is used to test for the adequacy of the correlation matrix. The Bartlett's test of Sphericity is highly significant at $p < 0.001$ which shows that the correlation matrix has significant correlations among at least some of the variables. Here, test value is 2408.491 and an associated degree of significance is less than 0.001. Hence, the null hypothesis that the correlation matrix is an identity matrix is rejected. To be specific, the variables are not orthogonal or the variables are oblique (correlated). The significant value less than 0.05 indicates that a factor analysis is worthwhile for the data set.

Table 8: Kaiser-Meyer-Olkin and Bartlett's Test of Sphericity

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.546
Bartlett's Test of Sphericity	Approx. Chi-Square	2408.491
	df	91

	Sig.	.000

Source: Researcher's Analysis from the SPSS Package Output (2023)

4.5.1.2. Factor Extraction

Kaiser's criterion and Scree plot test are used to determine the number of initial unrotated factors to be extracted. The eigenvalues associated with each factor represent the variance explained by those specific linear components. The coefficient value less than 0.4 is suppressed that will suppress the presentation of any factor loadings with values less than 0.4 (Kaiser, 1970).

Table 9: Eigenvalues and Total Variance Explained

Total Variance Explained									
	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.284	23.457	23.457	3.284	23.457	23.457	2.887	20.619	20.619
2	2.026	14.472	37.929	2.026	14.472	37.929	1.755	12.534	33.153
3	1.746	12.471	50.399	1.746	12.471	50.399	1.749	12.490	45.643
4	1.463	10.451	60.850	1.463	10.451	60.850	1.648	11.774	57.417
5	1.321	9.439	70.289	1.321	9.439	70.289	1.616	11.540	68.957
6	1.013	7.234	77.523	1.013	7.234	77.523	1.199	8.566	77.523
7	.824	5.883	83.405						
8	.669	4.780	88.185						
9	.468	3.342	91.527						
10	.362	2.588	94.115						
11	.268	1.913	96.029						
12	.230	1.640	97.668						
13	.182	1.300	98.968						
14	.144	1.032	100.000						
Extraction Method: Principal Component Analysis.									

Source: Researcher's Analysis from the SPSS Package Output (2023)

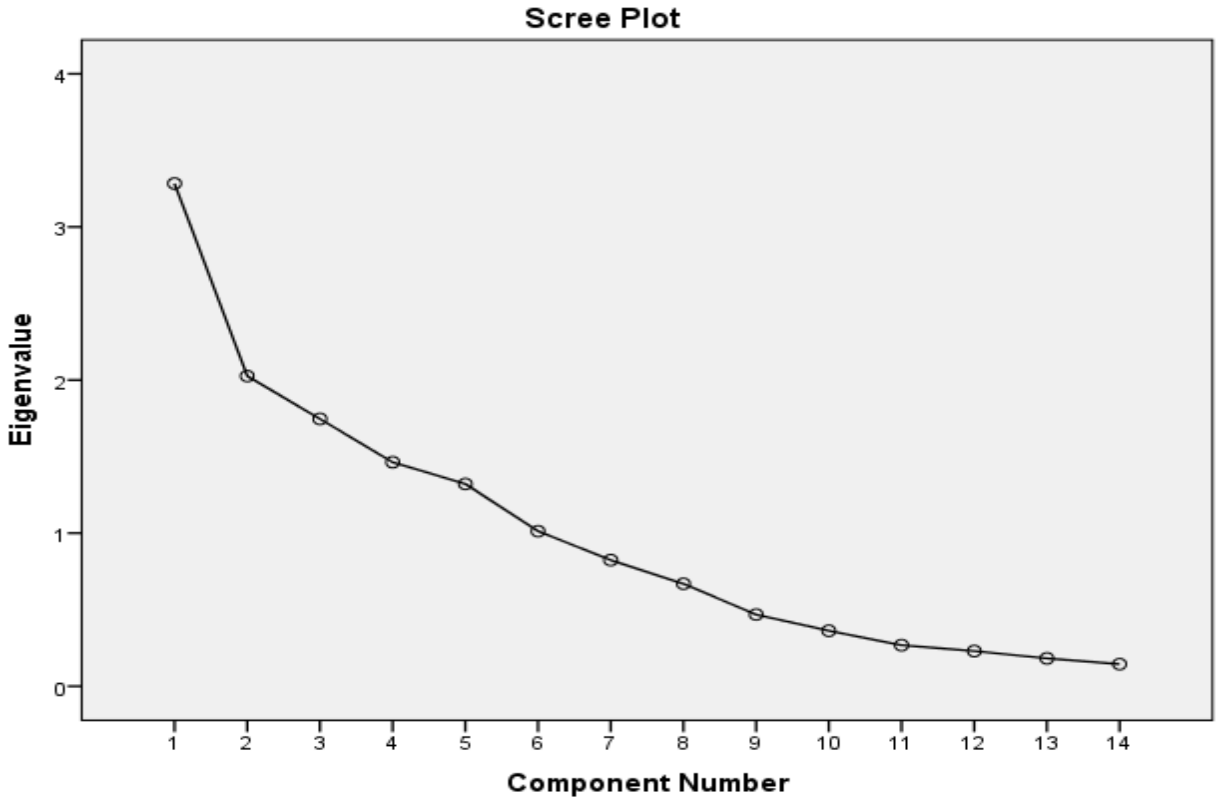
Table 9 demonstrates the eigenvalues and total variance explained. The extraction method of factor analysis used in this study was principal component analysis. Before extraction, fourteen linear components were identified within the data set. After extraction and rotation, there are six distinct linear components within the data set for the eigenvalue >1.

Total variance explained shows that six supply chain challenges affecting the humanitarian organization out of the fourteen recorded eigenvalues above 1 (i.e. 3.284, 2.026, 1.746, 1.463, 1.321 and 1.013). Further, the result indicated that the extracted humanitarian food aid supply chain challenges account for 20.619%, 12.534%, 12.490%, 11.774%, 11.540% and 8.566% respectively of the total variability in all of the fourteen variables together.

In Figure 2, for Scree plot test, a graph is plotted with eigenvalues on the y-axis against the fourteen component numbers in their order of extraction on the x-axis. The initial factors extracted are large factors with higher eigenvalues followed by smaller factors. Here, the scree plot shows that there are six factors for which the eigenvalue is greater than one and account for most of the total variability in the data. The other factors account for a very small proportion of the variability and considered as not so much important.

The scree plot is used to determine the number of factors to retain. From the Scree plot it can be observed that the factors within the steep gradient are six. After factor number six, the gradient assumes a plateau shape hence they are not very important in this study and will not be considered. This, therefore, means that the study extracted main supply chain challenges affecting humanitarian organization in Ethiopia.

Figure 2: Scree Plot



Source: Researcher's Analysis from the SPSS Package Output (2023)

4.5.1.3. Factor Rotation and Interpretation

The researcher has executed the extraction method based on principal component analysis and the orthogonal rotation method based on varimax with Kaiser Normalization. Table 10 exhibits factor loading, communality after extraction, mean and SD of extracted factors. The communalities reflect the common variance in the data structure after extraction of factors. Factor loading values communicates the relationship of each variable to the underlying factors. The variables with large loading values > 0.40 indicate that they are representative of the factor.

Table 10: Summary for Major Challenges of Humanitarian (Food Aid) Supply Chain

Factors		Communality after Extraction	Mean	SD	Rotated Factor Loadings[2]
Items	**Component 1: Transport, Storage & Security Challenges**				
1	Because the transport tracking management is very poor, transport companies are not able to trace the where about of each truck which is highly affecting the individual trucks effectiveness and efficiency. The new start of adopting modern technology like using of GPS whereby it will be possible to trace the location of each truck is highly advisable.	0.826	4.20	.671	0.878
2	Despite the insecured situation when the Federal and Tigray regional government fought each other WFP has faced a big challenge to move lifesaving commodity to the war affected people in Tigray region, i.e., more than 200 trucks were stacked in Semera for more than a month holding food assistance for which reason WFP incurs huge demurrage.	0.830	3.88	.861	0.835
3	Temporary warehouses (wiikHalls) are temperature sensitive by its very nature and is not recommendable to keep aid food for longer period of time in it as far as the quality of food is concerned.		4.11	.759	0.822
4	Mostly beneficiaries are forced to travel a long distance which takes them half day long to collect aid food as there is no any warehouse nearby the place where they are leaving place, which is also a big challenge for the humanitarian aid supply chain.	0.719	4.10	.701	0.657
5	Whilst transporting food through the insecured situation consolidating trucks in a convoy method is minimizing the risk of being looted and magnify visibility that the food is transported for lifesaving purpose.	0.470	4.08	.591	0.488
Items	**Component 2: Storage/Warehouse Challenges**				
6	Warehouse unavailability increases the lead-time of each truck as distribution is directly taking place from each truck.	0.890	3.36	.960	0.928
7	Due to unavailability of warehouses, distribution of food takes place direct from loading trucks which is time taking to release trucks back to the origin and in the end the humanitarian organization (WFP) incurring demurrage costs.	0.882	3.59	.898	0.871
Items	**Component 3: Infrastructure Challenges**				
8	Due to lack of the existence of accessible roads to get to places where emergency food is required becomes so difficult for on time assistance of the disaster affected people.	0.842	4.15	.705	0.908
9	With no regular maintenance of degraded/washed away, damaged roads and bridges it is so difficult to reach out beneficiaries and meet their needs, i.e. What is happening in most of the war zones, and heavy rains registered.	0.823	4.22	.732	0.848
Items	**Component 4: Transport Challenges**				
10	The overly usage of main roads which connects Ethiopia with the neighbouring corridors, in particular trucks overloaded than the standard of the country allowed by ministry of transport causes a negative impact on the incoming consignment of humanitarian aid which in effect affects the drought affected community.	0.781	.732	.732	0.859
11	Insufficiency of inland and overland trucks in the country (Ethiopia) causes imperfection to the humanitarian aid supply chain in terms of uplifting aid cargo from the neighbouring corridors and WFP hubs to places where the emergency food is required.	0.780	3.79	.640	0.803
Items	**Component 5: Security Challenges**				
12	Due to insecurity, trucks passing through war zones like *Semera*, *Serdo* and beyond there was an incident of trucks overturning and fire outbreak which causes the aid food and non-food items damaged which is said to be one of the humanitarian food aid drawback.	0.669	3.69	.600	0.802
13	Due to insecured situation occurred in Ethiopia some unprincipled & unethical truck drivers have been caught red handed while trying to smuggle non-aid commodity together with the aid food that causes lengthy time delayed until investigation is over	0.613	3.58	.495	0.739
Items	**Component 6: Security Challenges**				
14	In the case of man-made disaster (fighting between two or more groups) there is always an occurrence that, the humanitarian food aid supply chain is blocked somewhere in its way to the needy people for unlimited time and the food gets infested due to hot weather, which in the end causes incurring huge costs for the treatment the infested commodity.	0.926	3.98	.726	0.933

[2] Factor scores greater than 0.4 are considered stable (Guadagnoli and Velicer, 1988) and Stevens (1992) suggested 0.4 factor loading as a cut-off point.

Factors	Communality after Extraction	Mean	SD	Rotated Factor Loadings[2]
Extraction Method: Principal Component Analysis Rotation Method: Varimax with Kaiser Normalization				

Source: Researcher's Analysis from the SPSS Package Output (2023)

From each of the columns in table 10, the six principal components humanitarian food aid supply chain challenges with the highest loading (>=0.70) were selected. Based on this, the following humanitarian supply chain challenges were selected from the above table, which is also based on the rotated component matrix result attached in Appendix 3. From component one, items 1, 2 and 3 were selected as major factors. Hence, poorness of transport tracking management system, insecurity situation/war between the Federal and Tigray Regional government and construction of temporary warehouses (wiikHalls) were selected as major challenges affecting humanitarian aid supply chain. Due to such challenges, transport companies are not able to trace the where about of each truck which is highly affecting the individual trucks effectiveness and efficiency. Moreover, the security problem resulted in making WFP incur huge demurrage.

From component two, unavailability of warehouses was identified as major challenges. This challenge increased the lead-time of each truck, and it is time taking to release trucks back to the origin which in turn resulted in the humanitarian organization incur demurrage costs.

From component three, infrastructure (road) related challenges were identified as major challenge. Hence, due to lack of the existence of accessible roads to get to places where emergency food is required becomes so difficult for on time assistance of the disaster-affected people. Moreover, with no regular maintenance of degraded/washed away, damaged roads and bridges, it is so difficult to reach out beneficiaries and meet their needs (what is happening in most of the war zones and heavy rains registered).

From component four, all of the two items were selected as major challenges. The overly usage of main roads which connects Ethiopia with the neighboring corridors, in particular trucks overloaded than the standard of the country allowed by ministry of transport causes a negative impact on the incoming consignment of humanitarian aid which in effect affects the drought affected community. In addition, insufficiency of inland & overland trucks in the country causes imperfection to the humanitarian aid supply chain in terms of uplifting

aid cargo from the neighboring corridors and WFP hubs to places where the emergency food is required.

From component five and six, three security related items were selected as major factors affecting humanitarian supply chain. Accordingly, some unprincipled & unethical truck drivers have been caught red handed while trying to smuggle non-aid commodity together with the aid food that causes lengthy time delayed until investigation is over, trucks passing through war zones like *Semera*, *Serdo* and beyond there was an incident of trucks overturning and fire outbreak which causes the aid food and non-food items damaged. In addition, due to fighting between two or more local armed groups there is always an occurrence that the humanitarian food aid supply chain is blocked somewhere in its way to the needy people for unlimited time and the food gets infested due to hot weather, which in the end causes incurring huge costs for the treatment of the infested commodity.

4.5.2. Hypothesis Test Results

This section presents research hypotheses tests and the result of the test is presented in table 11 below.

Table 11: Summary of Hypotheses Results

	Hypotheses	**Decision**	**Method of Analysis**	**Rotation Test Statistics**
H_1	Infrastructure challenges have statistically significant difference to determine Humanitarian Supply Chain Performances.	Accepted	PCA	Factor Loadings[3] (i.e. >0.4)
H_2	Transport challenges have statistically significant difference to determine Humanitarian Supply Chain Performances.	Accepted	PCA	Factor Loadings (i.e. >0.4)
H_3	Security challenges have statistically significant difference to determine Humanitarian Supply Chain Performances.	Accepted	PCA	Factor Loadings (i.e. >0.4)
H_4	Storage challenges have statistically significant difference to determine Humanitarian Supply Chain Performances.	Accepted	PCA	Factor Loadings (i.e. >0.4)
Rotation Method: Varimax with Kaiser Normalization. Source: Researcher's Analysis from the SPSS Package Output (2023)				

[3] Factor scores greater than 0.4 are considered stable (Guadagnoli and Velicer, 1988) and Stevens (1992) suggested 0.4 factor loading as a cut-off point.

CHAPTER 5: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This chapter presents summary of major findings, conclusion and recommendations based on the study's overall findings.

5.1. Summary of the Major Findings

Six principal components for humanitarian food aid supply chain challenges were extracted to find the major challenges in WFP. Accordingly, the major humanitarian supply chain challenges in WFP were related to infrastructure, transport, security and storage. With regard to infrastructure, lack of the existence of accessible roads to get to places where emergency food is required and lack of regular maintenance of degraded/washed away, damaged roads and bridges were identified as the main challenges affecting the humanitarian activities of WFP.

Concerning the transport challenges, poorness of transport tracking management system, the overly usage of main roads which connects Ethiopia with the neighboring corridors and insufficiency of inland & overland trucks in the country were also identified as the main challenges affecting the humanitarian operations of WFP.

Regarding the major security challenges, war between the Federal and Regional governments, fighting between two or more local armed groups and due to the security problem occurred in Ethiopia some unprincipled & unethical truck drivers have been caught red handed while trying to smuggle non-aid commodity together with the aid food that causes lengthy time delayed until investigation is over. All these security issues highly & adversely affected the humanitarian food aid supply chain management of WFP.

Concerning storage challenges, temporary warehouses (wiikHalls) that are temperature sensitive and unavailability of warehouses were the main storage related factors adversely affecting the humanitarian food aid operations of WFP.

5.2. Conclusions

The study result implies that humanitarian aid supply chain challenges are multi-faceted and major challenges were related to infrastructure, transport, security and warehouses as far as humanitarian aid supply chain is concerned. Logistics challenges and poor infrastructure limit access to aid for already vulnerable and isolated communities. These logistical constraints exacerbate security management challenges and diminish the effectiveness of humanitarian responses or may even make them impossible.

Due to poor transport tracking management system, transport companies are not able to trace the where about of each truck which is highly affecting the individual trucks effectiveness and efficiency. Moreover, this resulted in incurring huge demurrage. It can also be inferred the trucks overloaded than the standard of the country allowed by ministry of transport causes a negative impact on the incoming consignment of humanitarian aid. Insufficient inland & overland trucks in the country causes imperfection to the humanitarian aid supply chain.

Security issue (war) between the Federal and Regional governments and fighting between two or more local armed groups affected the humanitarian food aid supply chain. Lack of accessible roads becomes so difficult for on time assistance of the disaster-affected people and absence of regular maintenance of degraded/washed away, damaged roads and bridges. Unavailability or lack of warehouses for humanitarian aid supply chain increased the lead-time of each truck and it is time taking to release trucks back to the origin which in turn resulted in the humanitarian organization incur demurrage costs.

5.3. Recommendations

The researcher makes the following suggestions in order to address the issues with the humanitarian supply chain based on the study's findings.

WPF need to strengthen its efforts of humanitarian aid through wholistic approach engaging all stakeholders for the speedy response in terms of transport provision of (road, air, sea and/or river) and storage solutions adapted to the logistical, operational and security challenges of the context. WFP humanitarian activities should optimize aid resources in emergencies and complex emergencies, increase access to isolated communities, guarantee the quality and traceability of transport, limit the effects of inflation and promote coordination between response concerned, the private sector, policymakers and public authorities.

WFP need also strengthen its logistical networks, which link various modes of transportation and storage with a variety of expertise and resources (humanitarian monitoring, prepositioning, deployment of emergency teams, security diagnostics, logistical vulnerability, accessibility, etc.). These technologies allow the same organization to proactively manage the supply chains for humanitarian relief, anticipating the demands of first responders for delivery and enabling their evaluation of the humanitarian needs.

WPF need also to step up efforts to improve physical access, including clearing rubble and repairing roads and bridges, to address issues that could hinder the delivery of supplies. WFP should concentrate and restore transportation routes to the most remote and vulnerable villages in addition to monitoring logistical weaknesses. By opening up impacted areas and enabling access to services and aid, the WFP can make it easier for local actors and humanitarian aid to reach these communities.

In order to assist humanitarian actors in understanding the most vulnerable populations in connection to their logistical environment, WFP needs to improve its analysis of logistical vulnerability. In order to make aid plans and operations more relevant, effective, and inclusive of the most inaccessible groups, it helps to prioritize and plan humanitarian resources.

For WFP to better manage the security risks associated with the logistical environment and respond autonomously to the requirements of humanitarian workers and their target communities, it must also step up its capacity building initiatives for the commercial sector. Additionally, WFP needs to step up its efforts to help its humanitarian partners enhance their

capacity in order to increase the effectiveness of relief distribution to the most vulnerable groups.

5.4. Future Research Recommendation

This research was conducted in a single humanitarian organization where the scope is very limited. Accordingly, it is advised for future researchers incorporate on similar organizations while perusing research in similar areas of interest to get a better view of humanitarian supply chain challenges. Moreover, future researchers can consider to see interdependencies among the variables mentioned.

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Appendixes

Appendix 1: Questionnaire

ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES
SCHOOL OF COMMERCE

Dear Respondents:

I would like to express my earnest appreciation for your generous time, honest and prompt response. This thesis entitled ***"Humanitarian Supply Chain Challenges of Food Aid in Ethiopia: The Case of World Food Program***." is intended to assess your awareness & perception for WFP.

The research is aimed at investigating the challenges (factors) affecting the performance of humanitarian food aid supply chain management in WFP. As a result, the effectiveness of the research is highly dependent on your contribution of providing accurate & reliable data. Information gathered will be treated with utmost confidentiality and will not be used for any other purpose (the secrecy of the information you provide is strictly protected). Please, note that participation in this research is entirely voluntary.

For further information, please contact Assefa Melese Zegeye @ +251913719282

Section I: Demographic Profile

INSTRUCTION: This part of the questionnaire asks your personal information. Please, respond to each question by putting a tick (✓) mark that represents your personal profile.

1. **Gender**
   ☐ Male ☐ Female
2. **Age**
   ☐ 25-34 ☐ 35-44 ☐ 45-54 ☐ 55-64
3. **Educational Background**
   ☐ Secondary School Completion ☐ Certificate ☐ College Diploma
   ☐ First Degree ☐ Second Degree and above
4. **Years of experience in your organization:**
   ☐ Below 5 Years ☐ 5-10 Years ☐ 10-15 Years
   ☐ Over 15 Years
5. **Years of experience in other humanitarian/non-humanitarian organizations:**
   ☐ Below 5 Years ☐ 5-10 Years ☐ 10-15 Years
   ☐ Over 15 Years
6. **Current position in your organization:**
   ☐ Supply chain Officer/Coordinator/Manager ☐ Procurement Associate
   ☐ Logistic Officer ☐ Logistics Associate
   ☐ Food technologist /Quality control expert ☐ Warehouse Operator

Section II: Please rate the statements below designed to measure the level of your agreement or disagreement in relation to the challenges (factors) affecting the performance of humanitarian food aid supply chain management in WFP. Select an option in the appropriate box against each question. Where:

SDA=Strongly Disagree D=Disagree N=Neutral A=Agree SA=Strongly Agree

S.N	**Infrastructure Challenges**	**SDA**	**D**	**N**	**A**	**SA**
1	Due to lack of the existence of accessible roads to get to places where emergency food is required becomes so difficult for on time assistance of the disaster-affected people.					
2	With no regular maintenance of degraded/washed away, damaged roads and bridges it is so difficult to reach out beneficiaries and meet their needs, i.e. What is happening in most of the war zones, and heavy rains registered.					
3	No action is taken by local and regional administration towards maintaining the existing roads and creating access establishing feeder roads whereby beneficiaries would be reached out					
4	Due to the type of trucks which are not compatible with the road across the country (Ethiopia), it affects timely assistance of beneficiaries affected by man-made or natural calamity.					
5	The non-existence of adequate infrastructure hindering the adoption of all types of mode of transport and causes an influence to take an advantage of each type to deliver humanitarian food aid in a timely fashion					
6	Majority of the Ethiopian roads which goes to places where drought affected people are found are not all weather roads which ultimately impeding the humanitarian aid operation not to properly serve the purpose.					
7	Because of poor quality of road construction most of the Ethiopian roads are damaged and washed away by flood which in effect the supply chain process is highly affected					
8	The overly usage of main roads which connects Ethiopia with the neighboring corridors, in particular trucks overloaded than the standard of the country allowed by ministry of transport causes a negative impact on the incoming consignment of humanitarian aid which in effect affects the drought affected community.					
	Transport Challenges	**SDA**	**D**	**N**	**A**	**SA**
1	Insufficiency of inland & overland trucks in the country (Ethiopia) causes imperfection to the humanitarian aid supply chain in terms of uplifting aid cargo from the neighbouring corridors and WFP hubs to places where the emergency food is required.					
2	Despite the inefficiency of trucks obtainable in the country (Ethiopia) there is also a cases when most of the commercial fleets commandeered by various forces to frontlines which in the end highly affect the humanitarian supply chain.					
3	Majority of truck owners, associations and PLCs engaged in inland & overland transport business are not stirred to increase the size of their transport business, number of trucks they have at present due to various factors such as, shortage of foreign currency, and also price of trucks is skyrocketing as a results of inflation, wear & tear (Lubricant, tire & spare parts) cost.					
4	Lack of coordination among various stakeholders such as government, WFP, and other NGOs (non-government organization) make the overland trucks scarcely available. For instance, Government and WFP aid cargo comes at the same time where it demands huge number of trucks but, it is not possible to position that many of trucks and eventually WFP happen to shunt the bulk cargo to silos situated near by the port and leased warehouses.					
5	The down time of trucks due to breakdown and maintenance escalates the shortage of overland and inland transport that in effect the humanitarian food aid supply chain is negatively impacted.					
6	The availability of trucks in the country (Ethiopia) and the amount of aid cargo is not matching and in the end the proper flow of humanitarian supply chain is affected which is to mean emergency food is getting late to reach beneficiaries.					
7	As most of the Ethiopian trucks are old in their models, it Lags the turnaround time of origin-destination that eventually affect truckers to timely position trucks in a timely manner.					
8	B/c the transport tracking management is very poor, transport companies are not able to trace the whereabouts of each truck which is highly affecting the					

	individual trucks effectiveness and Efficiency. The new start of adopting modern technology like using of GPS whereby it will be possible to trace the location of each truck is highly advisable.					
9	To bring about far reaching change in the transport sector of the country (Ethiopia) whereby fast action is to be implemented in terms of reaching out any of the disaster area, a holistic approach is highly recommended by all entities regarded as the humanitarian supply chain actor.					
10	Factors that hindering availability of sufficient overland-inland transport is the loading – offloading at the origin and destination point. For example, delay and trucks stranded for long in loading from any of WFP hubs to every destination points where beneficiaries are waiting for emergency assistance.					
	Security Challenges	**SDA**	**D**	**N**	**A**	**SA**
1	Security is one of the enabling factors for the successful flow of humanitarian food aid supply chain from the origin till the aid gets to the end point where the people affected by manmade or natural disaster are found.					
2	In the absence of peace and stability while moving humanitarian cargo there is a case where miss use of the food being diverted for wrong purpose and escalates the human suffering.					
3	In the case of manmade disaster (fighting between two or more groups) there is always an occurrence that, the humanitarian food aid supply chain is blocked somewhere in its way to the needy people for unlimited time and the food gets infested due to hot weather, which in the end causes incurring huge costs for the treatment the infested commodity.					
4	Within a situation which is unsecured like that of the recent one between federal and Tigray regional state, the humanitarian food severely diverted(misappropriated) in between the origin point and at the destination point by unethical group of community. i.e., this incident recurrently happened alongside of the road in Semera administration the food was transported from Adama WFP hub to Mekelle to assist the war affected people the same is also true in the final destination.					
5	Despite the in secured situation when the Federal and Tigray regional government fought each other WFP has faced a big challenge to move lifesaving commodity to the war affected people in Tigray region, i.e., more than 200 trucks were stacked in Semera for more than a month holding food assistance for which reason WFP incurs huge demurrage.					
6	Due to in secured situations in Tigray region, the cost of transport become tremendously high associated with various running cost increase, i.e. Fuel, spare parts and lubricants as a result of the war and which eventually become challenging for humanitarian aid supply chain.					
7	Due to insecured situation occurred in Ethiopia some unprincipled truck drivers have been caught red handed while trying to smuggle non aid commodity together with the aid food that causes lengthy time delayed until investigation is over					
8	Whilst transporting food through the insecured situation consolidating trucks in a convoy method is minimizing the risk of being looted and magnify visibility that the food is transported for lifesaving purpose.					
9	The humanitarian food aid operation in unsecured situation like that of what happened between the Federal and Tigray opposition creates a big loophole in terms of food diversion and misappropriation.					
10	Due to insecurity, trucks passing through war zones like Semera, Serdo and beyond there was an incident of trucks overturning and fire outbreak that causes the aid food and non-food items damaged which is said to be one of the humanitarian food aid drawback.					
	Warehouse/Storage Challenges	**SDA**	**D**	**N**	**A**	**SA**
1	Mostly beneficiaries are forced to travel a long distance which takes them half day long to collect aid food as there is no any warehouse nearby the place where they are leaving place, which is also a big challenge for the humanitarian aid supply chain.					

2	Humanitarian organizations including WFP uses temporary warehouses (WiikHall and Rub Halls) in which emergency relief food is prepositioned even though it is not sufficiently available and still the scarcity is there.					
3	Temporary warehouses (wiikHalls) are temperature sensitive by its very nature and is not recommendable to keep aid food for longer period of time in it as far as the quality of food is concerned.					
4	Permanently constructed warehouses are by far suitable for any aid food in terms of safety and quality in which food would be stored long, but it is very rare that humanitarian agencies take the initiative in constructing permanent warehouse.					
5	Due to unavailability of warehouses distribution of food takes place direct from loading trucks which is time taking to release trucks back to the origin and in the end the humanitarian organization (WFP) incurring demurrage costs.					
6	Warehouse unavailability increases the lead-time of each truck as distribution is directly taking place from each truck.					
7	Warehouse management practice is not possible in emergency response places where food is placed in open places under the shade of temporary materials like canvases and plastic sheets.					
8	Temporary warehouses optionally be constructed using local material and to be implemented as a temporary solution of emergency food storage.					

Appendix 2: Communalities

Table 12: Communalities

Communalities		
	Initial	Extraction
Due to lack of the existence of accessible roads to get to places where emergency food is required becomes so difficult for on time assistance of the disaster affected people.	1.000	.842

Communalities		
	Initial	Extraction
With no regular maintenance of degraded/washed away, damaged roads and bridges it is so difficult to reach out beneficiaries and meet their needs, ie. What is happening in most of the war zones, and heavy rains registered.	1.000	.823
The overly usage of main roads which connects Ethiopia with the neighboring corridors, in particular trucks overloaded than the standard of the country allowed by ministry of transport causes a negative impact on the incoming consignment of humanitarian aid which in effect affects the drought affected community.	1.000	.781
Insufficiency of inland & overland trucks in the country (Ethiopia) causes imperfection to the humanitarian aid supply chain in terms of uplifting aid cargo from the neighboring corridors and WFP hubs to places where the emergency food is required.	1.000	.780
Because the transport tracking management is very poor, transport companies are not able to trace the where about of each truck which is highly affecting the individual trucks effectiveness and Efficiency. The new start of adopting modern technology like using of GPS whereby it will be possible to trace the location of each truck is highly advisable.	1.000	.826
In the case of manmade disaster (fighting between two or more groups) there is always an occurrence that, the humanitarian food aid supply chain is blocked somewhere in its way to the needy people for unlimited time and the food gets infested due to hot weather, which in the end causes incurring huge costs for the treatment the infested commodity.	1.000	.926
Despite the in secured situation when the Federal and Tigray regional government fought each other WFP has faced a big challenge to move lifesaving commodity to the war affected people in Tigray region, i.e., more than 200 trucks were stacked in Semera for more than a month holding food assistance for which reason WFP incurs huge demurrage.	1.000	.830
Due to insecured situation occurred in Ethiopia some unprincipled & unethical truck drivers have been caught red handed while trying to smuggle non aid commodity together with the aid food that causes lengthy time delayed until investigation is over	1.000	.613
Whilst transporting food through the insecured situation consolidating trucks in a convoy method is minimizing the risk of being looted and magnify visibility that the food is transported for lifesaving purpose.	1.000	.470
Due to insecurity, trucks passing through war zones like Semera, Serdo and beyond there was an incident of trucks overturning and fire outbreak which causes the aid food and non-food items damaged which is said to be one of the humanitarian food aid drawback.	1.000	.669
Mostly beneficiaries are forced to travel a long distance which takes them half day long to collect aid food as there is no any warehouse nearby the place where they are leaving place, which is also a big challenge for the humanitarian aid supply chain.	1.000	.719
Temporary warehouses (wiikHalls) are temperature sensitive by its very nature and is not recommendable to keep aid food for longer period of time in it as far as the quality of food is concerned.	1.000	.802
Due to unavailability of warehouses distribution of food takes place direct from loading trucks which is time taking to release trucks back to the origin and in the end the humanitarian organization (WFP) incurring demurrage costs.	1.000	.882
Warehouse unavailability increases the lead-time of each truck as distribution is directly taking place from each truck.	1.000	.890
Extraction Method: Principal Component Analysis.		

Source: Researcher's Analysis from the SPSS Package Output (2023)

Appendix 3: Rotated Component Matrix

Table 13: Rotated Component Matrix

Rotated Component Matrix[a]						
	Component					
	1	2	3	4	5	6
Because the transport tracking management is very poor, transport companies are not able to trace the where about of each truck which is highly affecting the individual trucks effectiveness and Efficiency. The new start of adopting modern technology like using of GPS whereby it will be possible to trace the location of each truck is highly advisable.	.878					
Despite the in secured situation when the Federal and Tigray regional government fought each other WFP has faced a big challenge to move lifesaving commodity to the war affected people in Tigray region, i.e., more than 200 trucks were stacked in *Semera* for more than a month holding food assistance for which reason WFP incurs huge demurrage.	.835					
Temporary warehouses (wiikHalls) are temperature sensitive by its very nature and is not recommendable to keep aid food for longer period of time in it as far as the quality of food is concerned.	.822					
Mostly beneficiaries are forced to travel a long distance which takes them half day long to collect aid food as there is no any warehouse nearby the place where they are leaving place, which is also a big challenge for the humanitarian aid supply chain.	.657					
Whilst transporting food through the insecured situation consolidating trucks in a convoy method is minimizing the risk of being looted and magnify visibility that the food is transported for lifesaving purpose.	.488					
Warehouse unavailability increases the lead-time of each truck as distribution is directly taking place from each truck.		.928				
Due to unavailability of warehouses distribution of food takes place direct from loading trucks which is time taking to release trucks back to the origin and in the end the humanitarian organization (WFP) incurring demurrage costs.		.871				
Due to lack of the existence of accessible roads to get to places where emergency food is required becomes so difficult for on time assistance of the disaster affected people.			.908			
With no regular maintenance of degraded/washed away, damaged roads and bridges it is so difficult to reach out beneficiaries and meet their needs, ie. What is happening in most of the war zones, and heavy rains registered.			.848			
The overly usage of main roads which connects Ethiopia with the neighboring corridors, in particular trucks overloaded than the standard of the country allowed by ministry of transport causes a negative impact on the incoming consignment of humanitarian aid which in effect affects the drought affected community.				.859		
Insufficiency of inland & overland trucks in the country (Ethiopia) causes imperfection to the humanitarian aid supply chain in terms of uplifting aid cargo from the neighboring corridors and WFP hubs to places where the emergency food is required.				.803		
Due to insecurity, trucks passing through war zones like *Semera*, *Serdo* and beyond there was an incident of trucks overturning and fire outbreak which causes the aid food and non-food items damaged which is said to be one of the humanitarian food aid drawback.					.802	
Due to insecured situation occurred in Ethiopia some unprincipled & unethical truck drivers have been caught red handed while trying to smuggle non aid commodity together with the aid food that causes lengthy time delayed until investigation is over					.739	
In the case of manmade disaster (fighting between two or more groups) there is always an occurrence that, the humanitarian food aid supply chain is blocked somewhere in its way to the needy people for unlimited time and the food gets infested due to hot weather, which in the end causes incurring huge costs for the treatment the infested commodity.						.933
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.						
a. Rotation converged in 6 iterations.						

Source: Researcher's Analysis from the SPSS Package Output (2023)

Appendix 4: Descriptive Statistics Result (Demographic Profiles)

Table 14: Descriptive Statistics Result (Demographic Profiles)

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	294	65.0	65.0	65.0
	Female	158	35.0	35.0	100.0
	Total	452	100.0	100.0	

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	25-34	64	14.2	14.2	14.2
	35-44	125	27.7	27.7	41.8
	45-54	189	41.8	41.8	83.6
	55-64	74	16.4	16.4	100.0
	Total	452	100.0	100.0	

Educational background

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	College Diploma	20	4.4	4.4	4.4
	First Degree	193	42.7	42.7	47.1
	Second Degree and above	239	52.9	52.9	100.0
	Total	452	100.0	100.0	

Years of experience in your organization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below 5Years	51	11.3	11.3	11.3
	5-10 Years	53	11.7	11.7	23.0
	10-15 Years	189	41.8	41.8	64.8
	Over 15 Years	159	35.2	35.2	100.0
	Total	452	100.0	100.0	

Years of experience in other humanitarian/non- humanitarian organizations

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Under 5Years	125	27.7	27.7	27.7
	5-10 Years	108	23.9	23.9	51.5
	10-15 Years	32	7.1	7.1	58.6
	Over 15 Years	187	41.4	41.4	100.0
	Total	452	100.0	100.0	

Your present position in your organization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Supply chain Officer/Coordinator/Manager	31	6.9	6.9	6.9
	Logistic Officer	96	21.2	21.2	28.1
	Procurement Associate	42	9.3	9.3	37.4
	Food technologist /Quality control expert	21	4.6	4.6	42.0
	Logistics Associate	240	53.1	53.1	95.1
	Warehouse Operator	22	4.9	4.9	100.0
	Total	452	100.0	100.0	

Appendix 5: Descriptive Statistics Result (Supply Chain Challenge Items)

Table 15: Descriptive Statistics Result (Supply Chain Challenge Items)

Due to lack of the existence of accessible roads to get to places where emergency food is required becomes so difficult for on time assistance of the disaster affected people.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	21	4.6	4.6	4.6
	Neutral	20	4.4	4.4	9.1
	Agree	280	61.9	61.9	71.0
	Strongly Agree	131	29.0	29.0	100.0
	Total	452	100.0	100.0	

With no regular maintenance of degraded/washed away, damaged roads and bridges it is so difficult to reach out beneficiaries and meet their needs, ie. What is happening in most of the war zones, and heavy rains registered.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	20	4.4	4.4	4.4
	Neutral	22	4.9	4.9	9.3
	Agree	248	54.9	54.9	64.2
	Strongly Agree	162	35.8	35.8	100.0
	Total	452	100.0	100.0	

No action is taken by local and reginal administration towards maintaining the existing roads and creating access establishing feeder roads whereby beneficiaries would be reached out					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	11	2.4	2.4	2.4
	Disagree	96	21.2	21.2	23.7
	Neutral	167	36.9	36.9	60.6
	Agree	114	25.2	25.2	85.8
	Strongly Agree	64	14.2	14.2	100.0
	Total	452	100.0	100.0	

Due to the type of trucks which are not compatible with the road across the country (Ethiopia), it affects timely assistance of beneficiaries affected by man-made or natural calamity.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	76	16.8	16.8	16.8
	Neutral	84	18.6	18.6	35.4
	Agree	292	64.6	64.6	100.0
	Total	452	100.0	100.0	

The non-existence of adequate infrastructure hindering the adoption of all types of mode of transport and causes an influence to take an advantage of each type to deliver humanitarian food aid in a timely fashion					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	21	4.6	4.6	4.6
	Neutral	22	4.9	4.9	9.5
	Agree	336	74.3	74.3	83.8
	Strongly Agree	73	16.2	16.2	100.0
	Total	452	100.0	100.0	

Majority of the Ethiopian roads which goes to places where drought affected people are found are not all weather roads which ultimately impeding the humanitarian aid operation not to properly serve the purpose.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	43	9.5	9.5	9.5
	Neutral	42	9.3	9.3	18.8
	Agree	367	81.2	81.2	100.0
	Total	452	100.0	100.0	

Because of poor quality of road construction most of the Ethiopian roads are damaged and washed away by flood which in effect the supply chain process is highly affected					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	9	2.0	2.0	2.0
	Disagree	75	16.6	16.6	18.6
	Neutral	63	13.9	13.9	32.5
	Agree	198	43.8	43.8	76.3
	Strongly Agree	107	23.7	23.7	100.0
	Total	452	100.0	100.0	

The overly usage of main roads which connects Ethiopia with the neighboring corridors, in particular trucks overloaded than the standard of the country allowed by ministry of transport causes a negative impact on the incoming consignment of humanitarian aid which in effect affects the drought affected community.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	22	4.9	4.9	4.9
	Neutral	83	18.4	18.4	23.2
	Agree	314	69.5	69.5	92.7
	Strongly Agree	33	7.3	7.3	100.0
	Total	452	100.0	100.0	

Insufficiency of inland & overland trucks in the country (Ethiopia) causes imperfection to the humanitarian aid supply chain in terms of uplifting aid cargo from the neighboring corridors and WFP hubs to places where the emergency food is required.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	22	4.9	5.0	5.0
	Neutral	85	18.8	19.3	24.3
	Agree	290	64.2	65.8	90.0
	Strongly Agree	44	9.7	10.0	100.0
	Total	441	97.6	100.0	
Missing	System	11	2.4		
Total		452	100.0		

Despite the inefficiency of trucks obtainable in the country (Ethiopia) there is also a cases when most of the commercial fleets commandeered by various forces to frontlines which in the end highly affect the humanitarian supply chain.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	51	11.3	11.3	11.3
	Agree	303	67.0	67.0	78.3
	Strongly Agree	98	21.7	21.7	100.0
	Total	452	100.0	100.0	

Majority of truck owners, associations and PLCs engaged in inland & overland transport business are not stirred to increase the size of their transport business, number of trucks they have at present due to various factors such as, shortage of foreign currency, and also price of trucks is skyrocketing as a results of inflation, wear & tear (Lubricant, tire & spare parts) cost.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	21	4.6	4.6	4.6
	Neutral	42	9.3	9.3	13.9
	Agree	227	50.2	50.2	64.2
	Strongly Agree	162	35.8	35.8	100.0
	Total	452	100.0	100.0	

Lack of coordination among various stakeholders such as government, WFP, and other NGOs (non-government organization) make the overland trucks scarcely available. For instance, Government and WFP aid cargo comes at the same time where it demands huge number of trucks but, it is not possible to position that many of trucks and eventually WFP happen to shunt the bulk cargo to silos situated near by the port and leased warehouses.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	42	9.3	9.3	9.3
	Agree	294	65.0	65.0	74.3
	Strongly Agree	116	25.7	25.7	100.0
	Total	452	100.0	100.0	

The down time of trucks due to breakdown and maintenance escalates the shortage of overland and inland transport which in effect the humanitarian food aid supply chain is negatively impacted.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	22	4.9	4.9	4.9
	Neutral	54	11.9	11.9	16.8
	Agree	312	69.0	69.0	85.8
	Strongly Agree	64	14.2	14.2	100.0
	Total	452	100.0	100.0	

The availability of trucks in the country (Ethiopia) and the amount of aid cargo is not matching and in the end the proper flow of humanitarian supply chain is affected which is to mean emergency food is getting late to reach beneficiaries.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	95	21.0	21.0	21.0
	Neutral	21	4.6	4.6	25.7
	Agree	249	55.1	55.1	80.8
	Strongly Agree	87	19.2	19.2	100.0
	Total	452	100.0	100.0	

As most of the Ethiopian trucks are old in their models, it Lags the turnaround time of origin-destination which eventually affect truckers to timely position trucks in a timely manner.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	53	11.7	11.7	11.7
	Neutral	32	7.1	7.1	18.8
	Agree	281	62.2	62.2	81.0
	Strongly Agree	86	19.0	19.0	100.0
	Total	452	100.0	100.0	

B/c the transport tracking management is very poor, transport companies are not able to trace the where about of each truck which is highly affecting the individual trucks effectiveness and Efficiency. The new start of adopting modern technology like using of GPS whereby it will be possible to trace the location of each truck is highly advisable.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	9	2.0	2.0	2.0
	Neutral	11	2.4	2.4	4.4
	Agree	302	66.8	66.8	71.2
	Strongly Agree	130	28.8	28.8	100.0
	Total	452	100.0	100.0	

To bring about far reaching change in the transport sector of the country (Ethiopia) whereby fast action is to be implemented in terms of reaching out any of the disaster area, a holistic approach is highly recommended by all entities regarded as the humanitarian supply chain actress.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	11	2.4	2.4	2.4
	Disagree	10	2.2	2.2	4.6
	Neutral	40	8.8	8.8	13.5
	Agree	294	65.0	65.0	78.5
	Strongly Agree	97	21.5	21.5	100.0
	Total	452	100.0	100.0	

Factors that hindering availability of sufficient overland-inland transport is the loading – offloading at the origin and destination point. For example, delay and trucks stranded for long in loading from any of WFP hubs to every destination points where beneficiaries are waiting for emergency assistance.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	63	13.9	13.9	13.9
	Neutral	96	21.2	21.2	35.2
	Agree	293	64.8	64.8	100.0
	Total	452	100.0	100.0	

Security is one of the enabling factors for the successful flow of humanitarian food aid supply chain from the origin till the aid gets to the end point where the people affected by manmade or natural disaster are found.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	11	2.4	2.4	2.4
	Neutral	21	4.6	4.6	7.1
	Agree	238	52.7	52.7	59.7
	Strongly Agree	182	40.3	40.3	100.0
	Total	452	100.0	100.0	

In the absence of peace and stability while moving humanitarian cargo there is a case where miss use of the food being diverted for wrong purpose and escalates the human suffering.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	10	2.2	2.2	2.2
	Agree	220	48.7	48.7	50.9
	Strongly Agree	222	49.1	49.1	100.0
	Total	452	100.0	100.0	

In the case of manmade disaster (fighting between two or more groups) there is always an occurrence that, the humanitarian food aid supply chain is blocked somewhere in its way to the needy people for unlimited time and the food gets infested due to hot weather, which in the end causes incurring huge costs for the treatment the infested commodity.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	20	4.4	4.4	4.4
	Neutral	63	13.9	13.9	18.4
	Agree	274	60.6	60.6	79.0
	Strongly Agree	95	21.0	21.0	100.0
	Total	452	100.0	100.0	

Within a situation which is unsecured like that of the recent one between federal and Tigray regional state, the humanitarian food severely diverted(misappropriated) in between the origin point and at the destination point by unethical group of community. i.e., this incident recurrently happened alongside of the road in Semera administration the food was transported from Adama WFP hub to Mekelle to assist the war affected people the same is also true in the final destination.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	9	2.0	2.0	2.0
	Neutral	147	32.5	32.5	34.5
	Agree	232	51.3	51.3	85.8
	Strongly Agree	64	14.2	14.2	100.0
	Total	452	100.0	100.0	

Despite the in secured situation when the Federal and Tigray reginal government fought each other WFP has faced a big challenge to move lifesaving commodity to the war affected people in Tigray region, i.e., more than 200 trucks were stacked in Semera for more than a month holding food assistance for which reason WFP incurs huge demurrage.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	9	2.0	2.0	2.0
	Disagree	9	2.0	2.0	4.0
	Neutral	115	25.4	25.4	29.4

	Agree	211	46.7	46.7	76.1
	Strongly Agree	108	23.9	23.9	100.0
	Total	452	100.0	100.0	

Due to in secured situations in Tigray region, the cost of transport become tremendously high associated with various running cost increase, i.e. Fuel, spare parts and lubricants as a result of the war and which eventually become challenging for humanitarian aid supply chain.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	50	11.1	11.1	11.1
	Agree	402	88.9	88.9	100.0
	Total	452	100.0	100.0	

Due to insecured situation occurred in Ethiopia some unprincipled & unethical truck drivers have been caught red handed while trying to smuggle non aid commodity together with the aid food that causes lengthy time delayed until investigation is over

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	192	42.5	42.5	42.5
	Agree	260	57.5	57.5	100.0
	Total	452	100.0	100.0	

Whilst transporting food through the insecured situation consolidating trucks in a convoy method is minimizing the risk of being looted and magnify visibility that the food is transported for lifesaving purpose.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	61	13.5	13.8	13.8
	Agree	285	63.1	64.5	78.3
	Strongly Agree	96	21.2	21.7	100.0
	Total	442	97.8	100.0	
Missing	System	10	2.2		
Total		452	100.0		

The humanitarian food aid operation in unsecured situation like that of what happened between the Federal and Tigray opposition creates a big loophole in terms of food diversion and misappropriation.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	64	14.2	14.2	14.2
	Agree	242	53.5	53.5	67.7
	Strongly Agree	146	32.3	32.3	100.0
	Total	452	100.0	100.0	

Due to insecurity, trucks passing through war zones like Semera, Serdo and beyond there was an incident of trucks overturning and fire outbreak which causes the aid food and non-food items damaged which is said to be one of the humanitarian food aid drawback.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	11	2.4	2.4	2.4
	Neutral	139	30.8	30.8	33.2
	Agree	280	61.9	61.9	95.1
	Strongly Agree	22	4.9	4.9	100.0
	Total	452	100.0	100.0	

Mostly beneficiaries are forced to travel a long distance which takes them half day long to collect aid food as there is no any warehouse nearby the place where they are leaving place, which is also a big challenge for the humanitarian aid supply chain.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	9	2.0	2.0	2.0
	Neutral	63	13.9	13.9	15.9
	Agree	253	56.0	56.0	71.9
	Strongly Agree	127	28.1	28.1	100.0
	Total	452	100.0	100.0	

Humanitarian organizations including WFP uses temporary warehouses (WiikHall and Rub Halls) in which emergency relief food is prepositioned even though it is not sufficiently available and still the scarcity is there.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	42	9.3	9.3	9.3
	Agree	355	78.5	78.5	87.8
	Strongly Agree	55	12.2	12.2	100.0
	Total	452	100.0	100.0	

Temporary warehouses (wiikHalls) are temperature sensitive by its very nature and is not recommendable to keep aid food for longer period of time in it as far as the quality of food is concerned.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	9	2.0	2.0	2.0
	Disagree	11	2.4	2.4	4.4
	Neutral	21	4.6	4.6	9.1
	Agree	292	64.6	64.6	73.7
	Strongly Agree	119	26.3	26.3	100.0
	Total	452	100.0	100.0	

Permanently constructed warehouses are by far suitable for any aid food in terms of safety and quality in which food would be stored long, but it is very rare that humanitarian agencies take the initiative in constructing permanent warehouse.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	11	2.4	2.4	2.4
	Neutral	53	11.7	11.7	14.2
	Agree	260	57.5	57.5	71.7
	Strongly Agree	128	28.3	28.3	100.0
	Total	452	100.0	100.0	

Due to unavailability of warehouses distribution of food takes place direct from loading trucks which is time taking to release trucks back to the origin and in the end the humanitarian organization (WFP) incurring demurrage costs.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	11	2.4	2.4	2.4
	Disagree	40	8.8	8.8	11.3
	Neutral	127	28.1	28.1	39.4
	Agree	220	48.7	48.7	88.1
	Strongly Agree	54	11.9	11.9	100.0
	Total	452	100.0	100.0	

Warehouse unavailability increases the lead time of each truck as distribution is directly taking place from each truck.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	21	4.6	4.6	4.6
	Disagree	61	13.5	13.5	18.1
	Neutral	137	30.3	30.3	48.5
	Agree	201	44.5	44.5	92.9
	Strongly Agree	32	7.1	7.1	100.0
	Total	452	100.0	100.0	

Warehouse management practice is not possible in emergency response places where food is placed in open places under the shade of temporary materials like canvases and plastic sheets.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	11	2.4	2.4	2.4
	Disagree	125	27.7	27.7	30.1
	Neutral	73	16.2	16.2	46.2
	Agree	189	41.8	41.8	88.1
	Strongly Agree	54	11.9	11.9	100.0
	Total	452	100.0	100.0	

Temporary warehouses optionally be constructed using local material and to be implemented as a temporary solution of emergency food storage.					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	11	2.4	2.4	2.4
	Neutral	41	9.1	9.1	11.5
	Agree	346	76.5	76.5	88.1
	Strongly Agree	54	11.9	11.9	100.0
	Total	452	100.0	100.0	