THE EFFECTS OF FACTORS AFFECTING HUMANITARIAN SUPPLY CHAIN PERFORMANCE: THE CASES OF ACTION-AGAINST-HUNGER AND MEDECINES-SANS-FRONTIERES, ETHIOPIA MISSIONS

By

Gemechis Mekonnen Tolessa

(GSE/1290/05)

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Advisor: Shiferaw Mitiku (PhD)

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Approved by Board of Examiners

Shiferaw Mitiku (PhD)	_____	_____
Advisor	**Signature**	**Date**
Dr. Matewos Ensermu (Associate Professor)	_____	_____
Internal Examiner	**Signature**	**Date**
Bogale Alemu (PhD)		24 June 2020
External Examiner	**Signature**	**Date**

CERTIFICATION

I, certify that I have read and hereby recommend for acceptance by the **Addis Ababa University, School of Commerce** a thesis entitled: ***"Factors Affecting Humanitarian supply chain Performance: The Case of Action-Against-Hunger and Medecins Sans Frontier)"*** conducted by Gemechis Mekonnen under my guidance for the partial fulfillment of the requirements for the Degree of Masters in Logistics and Supply Chain Management.

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Dr. SHIFERAW MITIKU

(Advisor)

_____

Date

DECLARATION

I, **Gemechis Mekonnen Tolessa**, hereby declare that thesis entitled: ***"Factors Affecting Humanitarian Supply Chain Performance: The cases of Action-Against-Hunger and Medecins Sans Frontieres"*** is my own original work and that it has not been presented and will not be presented to any other Diploma or fellowship award and all the sources of materials used for the thesis have been duly acknowledged.

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Signature

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Date

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ABBREVATIONS AND ACRONYMS

AAH: Action-Against-Hunger

AWD: Acute Watery Diarrhea

BPRM: Bureau of population, Refugees and Migration

ECHO: European Civil Protection and Humanitarian Aid Operation

FSL: Food Security and Livelihoods

IDP: Internally Displaced People

INGO: International Non-Governmental Organization

HO: Humanitarian Organization

HSCM: Humanitarian Supply Chain Management

LNGO: Local Non-Governmental Organization

OCHA: Office for the Coordination of Humanitarian Affairs

OFDA: Office of Foreign Disaster Assistance

MSF: Medecines-Sans-Frontieres

MHCP: Mental Health and Care Practices

NGO: Non-Governmental Organization

SCC: Supply Chain Council

SCM: Supply Chain Management

SCOR: Supply Chain Operations Reference

TOC: Theory of Constraint

UN: United Nations

UNDP: United Nations Development Program

UNHCR: United Nations Higher Commissioner for Refugees

USAID: United States Agency for International Development

WASH: Wash, Sanitation and Hygiene

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ABSTRACT

The general objective of this research paper is to study factors affecting humanitarian supply chain performance: the cases of Action-Against-Hunger (AAH) and Medecines Sans Frontiers (MSF-Spain). The study employed both descriptive and explanatory research designs. Moreover, it employed a mixed research approach that involved quantitative and qualitative methods. Both primary and secondary data were collected and used for the study. The three factors that have been examined in this study are endogenous factors (human resource turnover, lack of performance metrics, lack of coordination, limited access to information system technology), situational exogenous factors (degraded infrastructure, environmental factors, socio-economic factors, governmental factors and donor restrictions) and non-situational exogenous factors (uncertainty and time pressure). The research is based on responses solicited from cross section of employees of Action-Against-Hunger and Medecins Sans Frontires(MSF-Spain). A total number of responses from 47 employees were used for analysis in this research study. With regard to sampling method, the study did not undertake rigorous statistical sample size calculation rather considered census method due to the limited population size of the study. Questionnaires with closed ended and five point Likert scale items were used as instrument to collect data for the research. The data collected were analyzed using SPSS 20.0 Version. Descriptive statistics was used to explain the demographic characteristics of respondents and to discuss the descriptive report of responses provided by the respondents on humanitarian supply chain practices and performance by measuring mean and standard deviation. Research questions were tested using statistical analysis of Pearson's Correlation and multiple linear regressions. The finding indicates that humanitarian supply chain practices such as procurement, inventory management, warehouse and transportation were properly practiced in the organizations. Moreover, the overall supply chain performance of AAH and MSF-Spain is flexible; cost-efficient; reliable and responsive. Factor analysis was conducted using the Kaiser-Meyer-Olkin(KMO) measure of sampling adequacy and the result has revealed all the KMO values where above 0.5 and were acceptable. Independent sample t-test was conducted using Independent Samples Mann-Whitney U Test to identify if there is mean difference between the two groups (Action-Against-Hunger and MSF-Spain) and the result has revealed that there is no mean difference between the two groups. The multiple regression result has shown that human resource turn over, lack of performance metrics, lack of coordination and limited access to information system technology (endogenous factor), degraded infrastructure, socio-economic factors, environmental factors, and donor restriction(situational exogenous factors) and uncertainty and time pressure(from non-situational exogenous factors) are significantly affecting humanitarian supply chain performances of AAH and MSF-Spain. However, governmental factor has been reported as less significant. Therefore, this study suggests future researchers to find out if this variable does not have effect on humanitarian supply chain performance. Overall, based on the inferential statistical result, this study recommends both organizations to focus on endogenous factors in general and human resource turnover, infrastructural factors and lack of coordination among humanitarian supply chain actors in particular.

***Key words**: Humanitarian supply chain performance, endogenous factors, situational exogenous factors, non-situational exogenous factors*

CHAPTER ONE

INTRODUCTION

The purpose of this research paper is to study factors affecting humanitarian supply chain performance with particular focus on Action-Against-Hunger and Medicines Sans Frontiers (MSF-SPAIN). This chapter includes background of the study; statement of the problem; research questions; objectives of the study; scope and limitation of the study, significance of the study and organization of the study.

1.1 Background of the study

Every year, humanitarian crisis caused by conflicts and natural disasters devastate millions of people and leave them unable to meet their basic survival needs. In the last couple of decades, there has been a significant increase in the number of man-made and natural disasters worldwide. Tatham and Houghton (2011) as cited by Muhammad, A. & Sebastian, K(2019) pointed out that the disasters have increased from around 220 per year in the mid-1990s to approximately 350-400 disasters per annum in recent years, affecting over 200 million people and are estimated to cost around US$200 billion. Global hunger has continued to rise over the past three years, with 821 million people now hungry and nearly 50 million children at risk of dying from hunger. Hunger levels have returned to where they were a decade ago, driven primarily by conflict, climate change and variability, and economic slowdowns (FAO, 2018). Moreover, since 2011, the number of refugees has been doubling. By the end of 2016, more than 65 million people worldwide had been forcibly displaced due to persecution, conflict and violence, (UNHCR,2016).

Recognizing the occurrence of natural and man-made disasters; therefore, the humanitarian aid organizations strive to save the lives of disaster affected people throughout the world (Anisya, T. & Kopczak, L., 2005). When a large-scale disaster happens, immediate

emergency responses are needed in order to save lives and relieve and control the damages (Kovacs and Spens, 2009). Successful relief operations need to ensure that the appropriate supplies are procured and transported 'in the right quantities, to the right people at the right location and at competitive prices' (Herrmann, 2007).

To respond to a disaster efficiently and effectively it is important for all participating LNGOs and INGOs to improve their performances. Yadav and Barve (2015) suggest that to improve performances of humanitarian supply chain activities, it is essential to understand determinant factors that affect humanitarian supply chain management. In humanitarian literature, these factors are referred as critical success factors (Pettit, Beresford, 2009; Yadav, Barve, 2015; Kabra & Ramesh, 2015, Eriksson & Karlsson, 2017) or key success factors (Oloruntoba, 2010) as cited by (Muhammad, A.& Sebastian, K.,2019).

The main purpose of this study; therefore, is to investigate critical factors affecting supply chain performance of Humanitarian Organizations operating in Ethiopia with a particular focus on AAH and MSF-SPAIN.

1.2 Statement of the Problem

The abiding prime objectives of HOs are to deal with disasters, to protect human rights, to provide relief services and promote the universal desire for personal and collective safety, security, respect, and dignity without any view to profit (Doyle, Gorman, Mihalkanin, 2016) as cited by Muhammad, A.& Sebastian, K.(2019). Humanitarian organizations are highly dependent on their logistics and supply chain management which represents approximately 80 percent of total relief budgets (Kent, 2004, Van Wassenhove, 2006).

Thus, sound, knowledgeable management of logistics and supply chain operations is vital to the successful achievement of humanitarian organization objectives. Humanitarian logistics and supply chain management operation cost is known to be approximately 25 percent higher than comparable business supply chain management operations (Whiting, Ayala-Öström 2009). The reasons for this are complex and can involve such factors as inherent uncertainty, limited local use of technology, human resource difficulties, and poor infrastructure (Antai, Mutshinda, Owusu, 2015) as cited by (Muhammad, S.& Kullapa, S. 2019). Moreover, according to (Day *et al*., 2012; Kovács and Spens, 2007; Holguín-Veras *et al.,* 2012), humanitarian supply chain management is a challenging research field because of the high uncertainty and complexity that characterizes disasters. According to Van Wassenhove, (2006), the logistics of getting (medical) aid items to beneficiaries in humanitarian supply chain management is challenging because demand uncertainty is typically high, road and IT infrastructures are often poor or non-existing, skilled personnel are in poor supply and the local government and population are not always supportive.

A study by Kovacs and Spens (2009) on the challenges in humanitarian logistics in the case of Ghana has found the inappropriate donations, delays, lack of funding, limits in use of funding, lack of transport infrastructure, lack of vehicles, and lack of warehouse as major external factors that affect the performance of humanitarian logistics. Similarly, a study by Kunz and Reiner (2012) identified four external factors affecting the performance of humanitarian logistics and supply chain management, namely, environmental situational factors, governmental situational factors, socio-economic situational factors, and infrastructural situational factors.

A study by Endale (2016) on the assessment of humanitarian supply chain management performance of selected organizations in Ethiopia concluded that agility, adaptability and alignment have positive relationship with the supply chain performance. Yosef (2018) conducted study on factors affecting humanitarian supply chain efficiency of International Rescue Committee, Ethiopia program and found out that longer lead time, lack of training and development, absence of consistent information communication technology, socio-economic factors, socio-political factors, donor factors, and repeated change affect humanitarian supply chain efficiency of the organization. Demeke (2016) has conducted study on the internal and situational external factors affecting humanitarian logistics of International Rescue Committee but did not include non-situational exogenous factor that affect humanitarian supply chain performance.

A study by Jateni (2018) on the challenges and practices of disaster preparedness and its effect on humanitarian logistics performance of the National Disaster risk Management Commission of Ethiopia has found high employees turnover rate, lack of coordination and gaps to allocate and raise funds and donations as factors that affect the performance of humanitarian logistics.

From the above findings, it can be understood that various researchers have used fragmented approaches and have come up with a number of problems and factors affecting humanitarian supply chain performance.

Disasters are not a new phenomenon in Ethiopia. In order to address both natural and man-made disasters, the country has been receiving humanitarian assistances from different organizations and donors located in different parts of the world. Nonetheless, despite the

existence of humanitarian operations in the country for decades, very few studies have been conducted on the state of humanitarian logistics and supply chain management in Ethiopia. Some of these studies were conducted to fulfill the requirement for master's degree (Demeke, 2016; Endale, 2016; Yosef, 2018; Jateni (2018).

But none of them combined and examined the three factors, namely, the endogenous factors(human resource, information technology, coordination and performance metrics), which relate to the internal operations; non-situational exogenous factors(uncertainty and time pressure), which are generic conditions that influence project outcomes and are outside immediate project control; and situational exogenous factors(Infrastructural, environmental, socio-economic, governmental and donor restriction) , which are project specific determinants of performance which significantly predict the performance of humanitarian supply chain in Ethiopian context.

In their empirical investigation of MSF-OCA medical supply chain performance, Van der Laan., *et al* (2016) found ample empirical evidence that various exogenous factors impact medical supply chain performance of the organization but suggested more empirical studies to identify specific factors and challenges that humanitarian organizations may face.

Therefore, this study will uniquely examine the three factors (endogenous, exogenous situational and exogenous non-situational factors) that influence humanitarian supply chain performance of Action-Against-Hunger and Medeceins Sans Frontiers (MSF-SPAIN), Ethiopia Missions.

1.3 Research Questions

The following research questions are developed to be answered as a result of the study:

- How humanitarian supply chain management is being practiced in AAH and MSF-SPAIN?
- To what extent endogenous factors (human resource turnover, limited access to information technology, lack of coordination and lack of performance metrics) affect the humanitarian supply chain performance of AAH and MSF-SPAIN?
- To what extent exogenous situational factors (degraded infrastructure, environmental, socio-economic, governmental factors and donor restrictions) affect the humanitarian supply chain performance of AAH and MSF-SPAIN?
- To what extent exogenous non- situational factors (uncertainty and time pressure) affect the humanitarian supply chain performance of AAH and MSF-SPAIN?
- What is the most critical factor affecting the humanitarian supply chain performances of AAH and MSF-SPAIN?
- What is the humanitarian supply chain performance of AAH and MSF-SPAIN?

1.4 Objectives of the Study

1.4.1 General Objective

The general objective of the study is to investigate factors affecting the humanitarian supply chain performance of the international humanitarian organizations, the case of Action-Against-Hunger (AAH) and Medecines Sans Frontiers (MSF-SPAIN), Ethiopia Missions.

1.4.2 Specific Objectives:

The specific objectives of the study are:

- To assess the humanitarian supply chain management practices of AAH and MSF-SPAIN.
- To determine the extent of endogenous factors (human resource turnover, limited access to information technology, lack of coordination and lack of performance metrics) role in affecting the humanitarian supply chain performance of AAH and MSF-SPAIN.
- To measure the extent of exogenous situational factors (degraded infrastructure, environmental, socio-economic, governmental factors and donor restrictions) role in affecting humanitarian supply chain performance of AAH and MSF-SPAIN.
- To assess exogenous non-situational factors role (uncertainty and time pressure) in affecting humanitarian supply chain performance of AAH and MSF-SPAIN.
- To identify the most critical factor affecting the humanitarian supply chain management performance of AAH and MSF-SPAIN.
- To measure humanitarian supply chain performance of AAH and MSF-SPAIN.

1.5 Scope of the study

Action-Against-Hunger (AAH) is operating in more than 47 countries and Medecins Sans Frontiers (MSF-SPAIN) is currently undertaking its operations in over 70 countries across the world. Geographically, however, the research was based on the data obtained from respondents involved in logistics and humanitarian supply chain management in the two mentioned humanitarian organizations operating in Ethiopia only.

Moreover, there are a significant number of humanitarian organizations operating in Ethiopia currently. However, due to resource constraint, the study is limited to the data that was obtained from two humanitarian organizations only. It did not consider other humanitarian organizations, government bodies and suppliers.

Conceptually, HSCM is abroad concept that encompasses various elements and variables. But again, the research is based on data collected by the researcher only on the three factors affecting humanitarian supply chain management system.

1.6 Limitation of the study

There are a significant number of humanitarian organizations operating in Ethiopia currently. However, due to resource and time constraints, the study is limited to the data collected from two humanitarian organizations only. It did not consider other humanitarian actors like donors, government bodies, suppliers, etc. Moreover, the study has faced limitations of relevant references as research on HSCM is only recently that it is gaining attention especially in Ethiopia.

1.7 Significance of the Study

Pursuant to the aforementioned statement of the problem, the study was carried out to seek whether the three factors affecting humanitarian supply chain management really do have an effect on humanitarian supply chain performance of AAH and MSF-SPAIN and make appropriate recommendations on how to address the existing problem.

The study is of great use to AAH and MSF-SPAIN Supply Chain Management Departments as it provides insight into their existing HSCM practices, HSCM functions to be undertaken in order to effectively and efficiently deliver humanitarian aid operations,

factors affecting these operations and measures and strategies required to overcome or mitigate these challenges.

The researcher would benefit from the research as it could contribute to the growing body of knowledge on the factors affecting humanitarian supply chain management in organizations' supply chain management function and assure the partial fulfillment of the requirement for the degree of masters in Logistics and Supply Chain Management upon completion of the study.

The study would also act as a source of reference for further studies to be done on humanitarian supply chain management in humanitarian organizations in Ethiopia. Future researchers will benefit from this research because it will provide them with relevant information on the topic.

Supply chain staffs of the two mentioned humanitarian organizations and other similar international NGOs will also benefit much from the study to be undertaken in line with humanitarian supply chain management system. The study will enable them to use the recommendations given to enhance high level of cooperation in their various job groups.

1.8 Definition of terms

- **Agility:** Agility is defined as the capability of flexibility in the various supply chain management processes; the procurement processes, distribution logistics processes, and manufacturing processes (Charles *et al*. 2010).

- **Cost:** Cost refers to the ability to efficiently utilize assets and is consolidated in Fritz Institute KPIs to financial efficiency (Frinz Institute, 2012).

- **Disaster:** A disaster can be defined as a tragic incident that occurs unexpectedly as a result of natural forces or human and technical errors; it often culminates in the loss of lives and damages to properties or the environment, as well as affecting the daily activities of local communities (Hassan *et al*., 2011and Susman *et al*., 1983). It can also be defined as disruption that cripples the functionality of a community causing major human, material, economic or environmental losses which surpass the ability of the affected people to cope using existing resources (Yadav *et al.*, 2015).
- **Efficiency**: Efficiency encompasses the ability to minimize the wastes, avoid redundancy and duplication of activities, conserve energy, and maximize effort while minimizing time taken and overall operational costs (Provan & Kenis, 2008).
- **Effectiveness**: Effectiveness is defined by rapid delivery of humanitarian goods, services and any other relief items, in minimum time (Cozzolino, 2012).
- **Reliability**: Reliability refers to the ability to perform tasks as expected corresponds with assessment accuracy (Fritz Institute, 2012).

  Responsiveness: Responsiveness refers to the speed at which tasks are performed and corresponds with donation-to-delivery time (Fritz Institute, 2012).
- **Supply Chain:** A supply chain is a network of autonomous or semi-autonomous business entities involved through up steam and downstream links, in different business processes and activities that produce physical goods or services to customers (Samaranayake, 2005).
- **Supply chain management:** Supply chain management is the task of integrating organizational units along a supply chain and coordinating

materials, information and financial flows in order to fulfill ultimate customer demands with the aim of improving competitiveness of the supply chain as a whole (Stadler, 2004).

- **Humanitarian Supply Chain Management**: "Humanitarian supply chain management is defined as the process of effective and cost-efficient plans, implementations and controls for aid flows (i.e., materials, goods, services, financial resources, information, etc.) from the point of origin to the point of consumption for the purpose of alleviating the suffering of vulnerable people (Thomas and Kopczac, 2005)." It can also be defined as managing the processes and systems involved in mobilizing people, resources, skills and knowledge to help vulnerable people affected by disaster (John, Ramesh, and Sridharan, 2012).

1.9 Organization of the paper

This study involves five chapters. The first chapter deals with the introduction and back ground of the study; statement of the problem; research questions; objectives of the study; scope of the study; limitation of the study and significance of the study. The second chapter focuses on the review of related literature. While third chapter deals with methods of the study, fourth chapter presents data. Finally, chapter five presents summary of the findings, conclusion, recommendation and direction for future study.

CHAPTER TWO

RELATED LITERATURE REVIEW

The purpose of this chapter is to review the works that other scholars and researchers have done in the areas of humanitarian supply chain management and supply chain performance. Theoretical and empirical reviews were done leading to a conceptual framework which is proposed to guide the study. The chapter begins with overview of humanitarian supply chain management followed by a review of the theories that underpin the concept of humanitarian supply chain management. The chapter then presents an empirical review of factors that affect humanitarian supply chain management of INGOs engaged in humanitarian operations. The research gap is identified and conceptual framework adopted is then discussed.

2.1 Theoretical Literature Review

2.1.1 Supply Chain Management: An Overview

Supply chain management is the task of integrating organizational units along a supply chain and coordinating materials, information and financial flows in order to fulfill ultimate customer demands with the aim of improving competitiveness of the supply chain as a whole (Stadler, 2004). Christopher (1998) views supply chain management as the network of various organizations involved both through upstream and downstream linkages in different kinds of activities and processes. Supply chain management framework consists of three major and closely related elements: business processes, management components and structure of the supply chain (Lambert *et al.,* 1998) as quoted in (Gupta and Sahay, 2007). The supply chain is composed of a great number of products, customers, delivery points, suppliers, costs, etc. in a complex network (*Ibid*). The approach of supply chain

management is derived from the fact that there are dependencies between levels in channels from the point of origin to the point of consumption (Lambert *et al*., 1998; Hakansoon and Snehota, 1995) as quoted in the works of Svensson, 2007).

Langely *et al*., (2006) identified five characteristics of supply chain management as follows: “Inventory visibility” which is managing the flow and level of inventory is the central focus of supply chain management and major performance metric to gauge success; “pull the inventory” through the supply chain in response to demand as opposed to pushing out inventory in advance of demand which tends to inflate inventory level and leads to obsolete inventory; “efficiency and lowering cost” is an important objective of supply chain management; “sharing of real-time information” is key factor for both efficiency and effectiveness in supply chain and finally reliability, on-time delivery and accuracy of order fulfillment are the most three dimensions of “customer service” to be filled by supply chain members.

2.1.2 Humanitarian Supply Chain Management

Humanitarian SCM and logistics have emerged as a worldwide-noticeable theme as disasters, either man-made or natural, may occur at any time around the world with enormous consequences (Yamada *et al*, 2006). The primary goal for HSCM is to minimize human suffering more specifically to prevent further loss of life and harm to humans, as well as provide immediate treatment to those with injuries and illness (Beamon and Balcik, 2008).

The way that supply chains are operated has a massive impact on the speed and quality of the assistance that can be provided. In addition, supply chain activities from purchasing to

the last-mile delivery of items account for a very large share of the cost in a disaster relief operation. Any improvement in the way supply chain provides humanitarian assistance has the potential to deliver a huge positive impact for people affected by disasters. There is also an increasing awareness as to the link between preparedness; response and recovery in that the better supply chain preparedness, the better and quicker response, and the earlier recovery back towards a normal state can occur (Kovacs and Spen, 2007). As pointed out by Anisya and Kopczak (2005), humanitarian supply chain management is central to disaster relief because it is crucial to the effectiveness and speed of response for major humanitarian programs, such as health, food, shelter, water, and sanitation and with procurement and transportation included in the function, it can be one of the most expensive parts of a relief effort.

2.1.3 Humanitarian versus Business Supply Chains

Even though the structure of humanitarian supply chain is similar to most business supply chain, the humanitarian supply chain is often unstable (Oloruntoba and Gray, 2006). Moreover, humanitarian supply chains operate under highly uncertain conditions relative to commercial supply chains (Wassenhove, 2006). Therefore, in humanitarian supply chains, coordination and management of disaster supply chains are increasingly needed and must be put in place.

Goals, revenue sources, and performance metrics of humanitarian and business supply chains differ notably. Unlike the humanitarian supply chains, which do not have any profit targets and rely heavily on volunteers and donors, in business supply chains, stakeholders are the “owners” of the chain. The goal of humanitarian supply chain is to be able to respond to multiple interventions, as quickly as possible and within a short time frame

(Wassenhove, 2006). According to Maghsoudi *et al*. (2018) a typical humanitarian operation mostly consists of disaster relief supply chain, this includes but is not limited to activities like needs assessment, planning, procurement, warehousing, and distribution of the supplies to beneficiaries. Costa *et al*. (2012) further explain that humanitarian supply chain resembles a lot with its commercial counterpart, for instance, they share similar activities like preparation, planning, procurement, transportation, storage tracking, and customs clearance. However, the main objective of the humanitarian supply chain in action is to provide the right supplies to the beneficiaries at the right time and location.

2.1.4 Humanitarian Supply Chain Performance

Humanitarian supply chain performance is "the effective collective performance of a complex system of international, national and locally-based organizations, which works to save lives, alleviate suffering and maintain human dignity both during and in the aftermath of man-made crises and natural disasters, as well working to prevent and strengthen preparedness for the occurrence of such situations"(Ramalingam and Mitchell ,2009). In addition "effective performance means undertaking work in ways that are consistent with humanitarian principles, mobilizing and deploying sufficient financial, material and human resources in ways that are relevant, well-managed, accountable, impartial, durable and ensure good quality"(Arnold ,2008).

One of the models that help in measuring performance of supply chain management is SCOR (Supply Chain Operations Reference Model). This model has been developed in 1996 by the Supply Chain Council (SCC), a global non-profit organization (*Ibid*). The SCOR model is a global standard for supply chain management, "a model that provides a

unique framework for defining and linking performance metrics, processes, best practices, and people into a unified structure"(Supply Chain Council,2012).

With a special view on performance measurement in humanitarian supply chain management, SCOR Level 1 metrics are strategic, high-level measures that cross multiple SCOR processes (Supply Chain Council, 2012). They can be adjusted to the organizations in the humanitarian supply chain. On the more detailed levels two and three the processes are defined and described more and more extensive, e.g. with input and output relationships and a foundation for benchmarking and best practice analysis. For the purpose of performance measurement level two includes five performance attributes and level three more detailed metrics, which are linked with the performance attributes. Performance attribute are used to express a strategy, they cannot be measured itself. Metrics measure the ability of a supply chain to achieve these strategic attributes. Most of the attributes and metrics can be applied for humanitarian logistics, some are not relevant (especially when detailing make processes) and some have to be defined in addition (attributes and metrics concerning donors in the whole supply chain) [*Ibid*].

A view into level two and its performance attributes exhibits that these attributes are generally in accordance with the key performance indicators created by the Fritz Institute for humanitarian logistics (Bolshe, 2013).

- *Responsiveness* attribute describes in SCOR level two as the speed at which tasks are performed corresponds with *donation-to-delivery time* (Fritz Institute, 2012).

- *Agility* attribute describes in SCOR level two as the ability to respond to external influences and the ability to change is not part of the KPIs developed by the Fritz Institute but is of high relevance for humanitarian logistics.
- *Costs* attribute describes in SCOR level two as the cost of operating the process and assets attribute describes in SCOR level two as the ability to efficiently utilize assets are consolidated in Fritz Institute KPIs to *financial efficiency*.
- *Reliability* attribute describes in SCOR level two as the ability to perform tasks as expected corresponds with *assessment accuracy* (Fritz Institute, 2012).

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

2.1.4.1. Appeal coverage

This indicator consists of two specific metrics: Percent of appeal coverage and percent of items delivered. The percent of appeal metric is the quantity of items that have been pledged by donors out of the total number of items requested for the operation. The purpose of this metric is to indicate how well and how quickly the organization is able to pledge for the requested aid both in terms of finance and the materials. The percent of item delivered metric is the percentage of items that have actually been delivered on-site out of the total number of items requested for the operation. Together, these two metrics indicate how well the organization is meeting its appeal for an operation in terms of both finding the donors and delivering items to the beneficiaries (Davidson, 2006).

Beamon and Balcik (2008) suggested a metric known as resource performance metric. The resource performance metric indicates the level of efficiency of the relief chain. This metric

helps the organization to accurately estimate the funding requirements and to demonstrate efficiency to the potential donors.

2.1.4.2 Donation-to-delivery time

This metric is a measure of how long it takes for an item to be delivered to the destination country after a donor has pledged to donate it. This metrics help gauge both the average and the consistency of the delivery lead times. Sometimes, the humanitarian organizations pledge the aid but do not deliver it. For example, in the case of the West Sudan, only one third of the promised financial aids were received (Oloruntoba, 2005).

Response time is another important performance metric in the HSCM. The factors contributing to the responsiveness of the HSCM are relief organization assessment, procurement and delivery strategies, supplier location, transportation choice, topology, safety, infrastructure, and politics (Beamon and Balcik, 2008).

2.1.4.3 Financial efficiency

Three metrics comprise the indicator of financial efficiency. The first two metrics use two methods (one relative and one absolute) to compare the budgeted prices to the actual prices paid for items delivered in the operation. The third financial efficiency metric incorporates the transportation cost of delivering the goods to the beneficiaries. This metric is expressed as a ratio of the total transportation costs incurred over the total costs for delivered items at a point in time. The value of this ratio should decrease over time, as less expensive transport methods are used after the initial delivery phase and as more items are delivered on-site (Davidson, 2006).

2.1.4.4 Assessment accuracy

How quickly donations are pledged and goods are delivered to beneficiaries relies on how accurately the field personnel assess the needs of the population affected after a disaster. Assessment accuracy; therefore, indicates how much the operation's final budget changed over time from the original budget. This metric contextualizes the values of the other metrics. For example, if it appears on the scorecard that the delivery's lead time of a specific type of item was longer than average in an operation, the assessment accuracy metric will indicate if the long lead time of that item was caused by an initially low estimation of the quantity needed(Davidson,2006).

2. 4.1.5 Flexibility metric

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

2.1.5 Theoretical framework of Supply Chain

2.1.5.1 Theory of Constraints on Supply Chain

By far the most popular approach to supply chain management is Goldratt's Theory of Constraint (TOC) (Triestch, 2005). The theory of constraints is a management paradigm

that views any manageable system as being limited in achieving more of its goals by a very small number of constraints and as such TOC uses a focusing process to identifying the constraints and restructure it to realize more thorough put through the system (*Ibid*). The theory of constraints is based on the premise that the goal achievement by a goal oriented system is limited by at least one constraint (Triestsch, 2005). Only by increasing flow through the constraint(s) can overall output be increased and the objectives of the system realized (Goldratts, 2004).

Assuming the goal of the system has been articulated and its measurement defined, the steps include identifying the systems constraint, deciding how to exploit the constraint, subordinate everything else to align the whole system and make changes (Goldratt, 2004). Constraints according to (Noreen, Smith & Mackey, 1995) can be external or internal to the system and include such phenomenon as constraints of equipment, policy and regulation, lack of skilled people. The theory of constraint has been used in the supply chain management to provide solution towards greater availability and flow of inventory by identifying constraints such as, and offering management techniques to reduce replenishment time, lead time, and late deliveries (Herman, 2000). Therefore, this theory is relevant for this study as any improvements in such areas will improve availability of aid supplies, goods and services to the beneficiaries.

2.1.5.2 The Network Perspective (NT)

The performance of a firm depends not only on how efficiently it cooperates with its direct partners, but also how well these partners cooperate with their own business partners. Network can be used to provide a basis for the conceptual analysis of reciprocity (Oliver, 1990) in cooperative relationship. Here, the firm's continuous interaction with other

players becomes an important factor in the development of new resources (Hankansson and Ford, 2002). Relationships combine resources of two organizations to achieve more advantages than through individual efforts. Such a combination can be viewed as a quasi-organization (Hankansson and Snehota, 1995); Hankansson 1987). The value of resource is based on its combination with other resources, which is why inter-organizational ties may become more important than processing resources per se. Links between firms in a network develop through two separate, but in closely linked types of interaction; exchange processes (information, goods and services, and social processes) and adaptation processes (personnel, technical, legal, logistics and administrative elements (Johanson and Mattsson, 1988). Therefore, network theory is relevant for this study as a number of supply chain actors closely, collaboratively and interactively work together for the successful undertakings of humanitarian supply chain operations.

2.1.5.3 General Systems Theory on Supply Chain

The general systems theory was developed initially by Von Bertalanffy (1969) in the field of biology and extended by Weinberg (1975), Miller (1978) and Yourdon (1989) into paradigms of management (Rudolf, 2011). Bertalanffy (1969), a biologist who through his work on general body systems found that given the interaction between a system's components, a system was often more than just the mere sum of its components; it involves the interaction between components, differently, within the larger system. Miller (1978) argued that in most cases, real world systems are open systems which interact with, and are often influenced by, the external environment.

Another important concept of a system is the definable boundary that separates a system from its environment and allows inputs to and outputs out of the system (Rudolf, 2011).The

general systems theory according to Rudolf (2011) identifies four general systems principles. These principles are; “The more specialized or complex a system is, the less adaptable it is to its environment”, “The larger the system, the more the resources are required to support the system”, “Systems often contain other systems, and are in themselves components of larger systems” and “Systems grow proportionally to resources allocated to the system.”

Supply chains are considered systems of providing flow of good, product or services to consumers (Chopra & Meindl 2004). The contribution of the general systems to supply chain can be seen from this view point that the supply chain is a system with inputs and expected outputs, to inform management of supply chain. Handfiled & Nicholas (1999) explains that, within the context of the general systems theory, the supply chain includes the management of information systems, sourcing and procurement systems, logistics systems, order and customer service systems and integration of these activities through improved relations between these systems can be used to gain competitive advantage. Therefore, the general systems theory is relevant for this study as it provides opportunity to distinguish subsystems and variables that operate within a supply chain leading to a better understanding of the dynamics within the supply for better study and improvements while undertaking humanitarian operations.

2.1.6 Humanitarian Supply Chain Management Practices

Humanitarian supply chain is the central to disaster relief due to its function to serve as a bridge between disaster preparedness and response as well as between procurement and distribution (Van Wassenhove, 2006). It depends on the most productive supply chain management practices being put in place, relative to vital activities such as procurement,

warehousing, transportation and distribution, planning and execution (Fritz Institute 2010; Tatham & Pettit 2010).

2.1.6.1 Sourcing /procurement practice in HSCM

One important element of supply chain management is the sourcing and procurement of materials and services (Vitasek, 2010). Procurement is the process of obtaining services, supplies, and equipment in conformance with applicable laws and regulations and can take place locally, nationally, and internationally among a number of public, private, national, and local entities (Rao, *et al.*, 2006).

Procurement of items or services is the foundation for satisfying demand. "It consists of all those activities necessary to acquire goods and services consistent with user requirements (Coyle, et *al*., 2003).

After a disaster strikes, relief organizations conduct an initial assessment (usually within one day after occurrence).The expected quantity of supplies required to meet the relief needs of the affected population is estimated (Thomas, 2003) as well as pre-positioned supplies, already available at the organizations warehouses, are evaluated. Relief items, which need to be procured from suppliers, are then determined (Balcik & Beamon, 2008).

Typical procurement/sourcing process includes: identifying needs, defining user requirements, deciding to make or buy the item or service, deciding how the item will be obtained, searching the market and selecting a supplier, taking delivery and evaluating the purchase (Coyle *et al*., 2003). Selecting a supplier is an important part of constructing a reliable and responsive supply channel. When procuring inventory, the supply chain should

consider quality of the product, reliability, capability, and financial stability of the vendor, and other desirable qualities such as proximity and hidden costs (*Ibid*).

Many organizations have found it useful to prepare procurement manuals as a guide to company personnel (Yosef, 2018). Procurement manuals, standard operating procedures and guidelines help to identify and implement the procurement processes the organization uses to undertake procurement activities. As with most commercial or humanitarian supply chains, the MSF-SPAN supply chain starts with the identification of needs and via a process of requesting, procurement, reception, storage, transportation, delivery and distribution and ends with the fulfillment of this need. The procurement process at MSF-SPAIN include the following process: preparing purchase request (PR), preparing request for quotation (RFQ), conducting comparative bid analysis (CBA), supplier selection, issuing purchase order (PO)/contract, receiving goods to warehouse and issuing reception note, and effecting payment once goods are received to warehouse. Moreover, the MSF supply chain is supported by an automated software system tool known as LogistiX 7 to manage procurement activities. LogistiX 7 is also a procurement tracking system that provides information about the status of the orders and detailed description about the suppliers' performance (MSF-SPAIN procurement manual, 2014).

Similarly, AAH has its own standard operating procedures to undertake procurement activities which can be accessed from the organization's Kitlog. The procurement process at AAH include raising the procurement line (PL), preparing request for quotation(RFQ), collecting quotation from suppliers, conducting assessment table (AT), supplier selection, issuing supplier purchase order(SPO), preparing reception note(RN) and effecting payment once goods are received to warehouse. AAH supply chain is supported by an automated

software system tool known as LINK system to manage procurement activities. AAH LINK system provides information on status of procurement and also provides information on supplier performance (AAH Kitlog).

2.1.6.2 Inventory Management Practice in HSCM

Inventory is a stock of goods kept for sale or use in the future (Stevenson and Hojati, 2004). Relief organizations stockpile ready-to-dispatch inventory in locations with access to disaster prone regions (Balcik & Beamon, 2008). In other words, the most effective, most efficient response to any disaster is made possible by intelligent pre-positioning of inventory and optimum allocation of resources (Merminod *et al*., 2014). "Inventory management in relief operations is unique in that the time values of the commodities are much greater than the inventory carrying costs. Having the food available and moving it as rapidly as possible is much more important than holding minimal stock levels" (Long and Wood, 1995). It is argued that until real demand is known and it can be processed with an agile approach, generic inventory should be held as long as possible (Christopher & Towill, 2002). Then, if a disaster occurs what could contribute to the ability of an agile and quick response is a need assessment, thereby understanding the needs of the beneficiaries (Oloruntoba & Gray, 2006).

One important aspect of inventory management practice is stock control and movement. Stock control is used to show how much stock at hand at any time, and how you keep track of it (Business link, 2012). The vital stock control measurements include: establishing levels of operating stocks based on consumption/rate of usage; ensuring that weekly and monthly stock balances reports of each stock item and the total value are prepared; maintaining monthly stock usage report of each item kept in the store and the overall usage

trend in six months; reviewing and reporting on a biannual basis slow moving items indicating the last movement date, the unit value, and total value, and liaise with user department; establishing quantity, lead -time and availability of each item supplied on the market; and tracking orders for goods.(Muller,2011).

As part of inventory management practice, humanitarian organizations use different templates and standard forms to receive and issue materials from warehouse and also present stock balance of items in the warehouse. In line with this both, AAH and MSF-SPAIN use Reception Notes (RN) to receive goods to store; Delivery Notes (DN) to issue goods from warehouse and stock control card to show inventory balance in the warehouse (AAH Kitlog & MSF supply guideline, 2014).

In MSF-SPAIN, a complete physical count is conducted every three months for all stocks in all sites under the supervision of the Supply Manager. It is mandatory to make a complete inventory always by the end of the year. Monthly, a random inventory check is done for items with high frequency of movement. Any discrepancies between the stock cards, physical count, and Logistix7 database is fully explained by the store keeper or the person responsible. The organization uses first-in-first out (FIFO) inventory management system to issue goods from store (MSF supply guideline, 2014).

2.1.6.3 Transportation management practice in HSCM

Delivery of humanitarian services to beneficiaries is one of the most critical operations of HSCM which is known as last mile delivery (Balcik *et al*., 2008). The focus of last mile delivery is the fleet system used to transport the goods, material and people (Apte 2009). For HOs, fleet management is the second largest overhead cost, being 15% of the total

humanitarian relief logistics cost (Falasca & Zobel, 2011; Martinez, Stapleton & Van Wassenhove, 2011). Transport management in emergencies is a complex task depending on the nature of the disaster. How it is structured is very dependent on the state of infrastructure, security in the area of disaster, demand, nature of product etc. (Logistics Cluster, transport, 2011)

Moreover, efficient and effective fleet management and distribution systems are highly dependent on selection of an appropriate route. Transport is critical in disaster relief and an important aspect of humanitarian logistics is the requirement to address mode, utilization of capacity, scheduling, and maintenance in such circumstances (Pettit & Beresford, 2009). Faster and more costly transportation permits maintenance of lower inventory levels kept as a result of a more responsive system (Coyle *et al*., 2003).

2.1.6.4 Warehouse/Facility Location in HSCM

Facility location is a key problem that has a considerable effect on the success of relief operations (Nahleh *et al*., 2013). Facility location concerns the placement of facilities taking several characteristics into account such as demand, size and location (Caunhye, Nie, & Pokharel, 2012). KaMinsky & Simchi-Levi (2008) state that business literature indicates that facility location decisions involve the number, location, size and capacity of each facility. These considerations also apply to the humanitarian sector (Richardson, Leeuw & Vis, 2010). Facility location decisions have a direct impact on the operating cost and on the timeliness of response to the demand (Haghani, 1996). In order to respond quickly to the onset of a disaster, facility location and stock pre-positioning are therefore key decisions in humanitarian relief (Balcik & Beamon, 2008). Distributing relief supplies from strategically- located warehouses improves the efficiency of disaster relief in

economic terms, but also in terms of transportation efficiency, speed and demand satisfaction (Döyen, Aras & Barbarosoğlu, 2012). In humanitarian supply chains, this may translate into minimizing transportation cost (Drezner, 1995) and delivery time (Akkihal, 2006). In fact, within relief operations, a faster delivery time will often be chosen over lower costs (Ibid).

2.1.7 Factors that affect humanitarian supply chain performance

The humanitarian context comes with several conditions that make humanitarian operations particularly challenging. A distinction can be made between endogenous factors, which relate to the way operations are managed; non-situational exogenous factors, which are generic conditions that influence project outcomes and are outside immediate project control; and situational exogenous factors, which are project specific determinants of performance (Van der Laan., *et al*, 2016).

2.1.7.1 Endogenous Factors

Endogenous performance determinants originate from within the supply chain, and can be directly influenced by the supply chain actors themselves. Examples are factors related with personnel, information systems and coordination of activities. Humanitarian organizations often struggle with attracting, training and withholding skilled staff (Van Wassenhove, 2006; Thomas & Kopczak, 2005). High staff turnover rates lead to difficulties in knowledge transfer (Kovacs & Spens, 2009; Van der Laan *et al*., 2009).Limited access to and use of technology (Beamon, 2004; Van der Laan *et al*., 2009), such as information systems and software tools, make it hard or impossible to retrieve, store, distribute (Lee and Lee, 2007; Van Wassenhove & Pedraza Martinez, 2012; Van der Laan *et al.*, 2009b) and analyze field data. The practical experience in different

humanitarian aid organizations indicates that information systems put in place to help meet emergency program requirements are very incomplete, ineffective or inefficient (Maxwell & Watkins, 2003). Moreover, various studies (Oloruntoba & Gray, 2006; Thomas & Mizushima, 2005 as cited in Overstreet *et al*., 2011) found that logistics operations in different humanitarian aid organizations are still largely manual. Therefore, it is mostly common for aid agencies to have multiple incompatible information systems about their responsibilities in the operation of logistics in emergency relief (Maspero & Itmann, 2008 cited in Overstreet *et al*., 2011).

Moreover, lack of standards and performance indicators (Thomas and Kopczak, 2005; Van der Laan *et al*., 2009) impede proper improvement of supply chain processes. Effective and efficient operation of logistics performance depends on successful management of internal and external relationships (Christopher, 2005). However, the study by (Anisya, T. & Kopczak, L., 2005) indicates that there is lack of collaboration among various humanitarian aid organizations. Lack of coordination with supply chain actors (Thomas and Kopczak, 2005; Kovacs and Spens, 2007; Samii, 2010) and external stakeholders (Van der Laan *et al*., 2009) may lead to oversupply in some regions and under-supply in others, while competing for the same resources drives up prices. The negative performance impact of these endogenous factors may be expected to be mitigated over time, as the role of logistics is more and more acknowledged within the supply chain (Thomas and Kopczak, 2005; Van der Laan *et al.*, 2009b).

H_1: *High Human Resource turnover negatively and significantly affect HSC performance.*

H_2: *Limited access to information technology negatively and significantly affects HSC performance.*

H_3: *Lack of coordination among humanitarian actors negatively and significantly affects HSC performance.*

H_4: *Lack of performance metrics negatively and significantly affects HSC performance.*

2.1.7.2 Situational Exogenous Factors

By contrast, situational exogenous factors originate from outside the supply chain and hence are beyond the immediate control of supply chain actors. Kunz and Reiner (2012) propose a classification of these factors consisting of infrastructural factors, like local transportation capacity and road/main port accessibility, environmental factors (influencing the demand for certain medicines), socio-economic factors (influencing the supply of goods and skilled labor), and governmental factors (the political climate is often volatile, trucks might be stopped or blocked by rebel forces in times of war, looting of the supply might occur, or vehicles are even completely deviated from the intended location). Finally, donor restriction: donors often request their funds be spent on direct materials and food, and even at a particular disaster location, rather than on crucial but indirect services such as information systems, staff training, and/or disaster preparedness (Kovacs and Spen, 2007).

H_5: *Degraded infrastructure negatively and significantly affect HSC performance.*

H_6: *Environmental factors negatively and significantly affect HSC performance.*

H_7: *Socio-economic negatively and significantly affects HSC performance.*

H_8: *Governmental factors negatively and significantly affect HSC performance.*

H_9: *Donor restriction negatively and significantly affects HSC performance.*

2.1.7.3 Non-Situational Exogenous Factors

Furthermore, non-situational exogenous factors are characteristics of the humanitarian relief environment, not connected to the disaster-affected area. Examples are the uncertainty about the size, timing and location of demand for aid (Beamon, 2004). Unlike logisticians in the private sector, humanitarian workers always face the unknown: when, where, what, how much, where from and how many times; in short, the basic parameters needed for an efficient supply chain setup are highly uncertain (Van Wassenhove, 2006). Other examples are: the presence of a large number of stakeholders, which complicates the relief effort; the complexity of circumstances, which can obscure the precise nature of the aid request; and the time pressure, which calls for quick action (Van Wassenhove, 2006).

Additionally, the type of relief, emergency or long-term (Minear, 1996), the time elapsed since the start of the relief, the scale of the operation and the criticality of product demand may influence the amount of data and knowledge available.

H_{10}: *Uncertainty negatively and significantly affects HSC performance.*

H_{11}: *Time pressure negatively and significantly affects HSC performance.*

2.2 Empirical Literature Review

A number of studies have been undertaken on factors affecting humanitarian supply chain management with varying results reported.

A study by Kovacs and Spens (2009) on the challenges in humanitarian logistics in the case of Ghana has found the inappropriate donations, delays, lack of funding, limits in use of funding, lack of transport infrastructure, lack of vehicles, and lack of warehouse as major external factors that affect the performance of humanitarian logistics.

Similarly, a study by Kunz and Reiner (2012) identified four external factors affecting the performance of humanitarian logistics and supply chain management, namely, environmental situational factors, governmental situational factors, socio-economic situational factors, and infrastructural situational factors.

A study by Endale (2016) on the assessment of humanitarian supply chain management performance of selected organizations in Ethiopia concluded that agility, adaptability and alignment have positive relationship with the humanitarian supply chain performance.

Yosef (2018) conducted study on factors affecting humanitarian supply chain efficiency of International Rescue Committee, Ethiopia program and found out that longer lead-time, lack of training and development, absence of consistent information communication technology, socio-economic factors, socio-political factors, donor factors, and repeated change affect humanitarian supply chain efficiency of the organization.

Demeke (2016) has conducted study on the internal and situational external factors affecting humanitarian logistics of International Rescue Committee and examined their effects using survey data analyzed through empirical study and identified seven statistically significant variables both from internal & external factors. The factors are listed in descending order from highest to lowest as: donors' funds, environmental situational factors, professional staff, infrastructure situational factors, socioeconomic situational factors, Institutional learning and government situational factors.

A study by Jateni (2018) on the challenges and practices of disaster preparedness and its effect on humanitarian logistics performance of the National Disaster risk Management Commission of Ethiopia has found high employees turnover rate, lack of coordination and

gaps to allocate and raise funds and donations as factors that affect the performance of humanitarian logistics.

In their empirical investigation of MSF-OCA medical supply chain performance, Van der Laan., *et al* (2016) found ample empirical evidence that various exogenous factors impact medical supply chain performance of the organization but suggested more empirical studies to identify specific factors and challenges that humanitarian organizations may face.

2.3 Conceptual Framework

Based on the review of the related literatures, the research framework has been developed. The below conceptual framework shows the relationship between the factors affecting humanitarian supply chain performance: endogenous factors, situational exogenous factors and non-situational exogenous factors and the dependent variable (Humanitarian Supply Chain Performance).

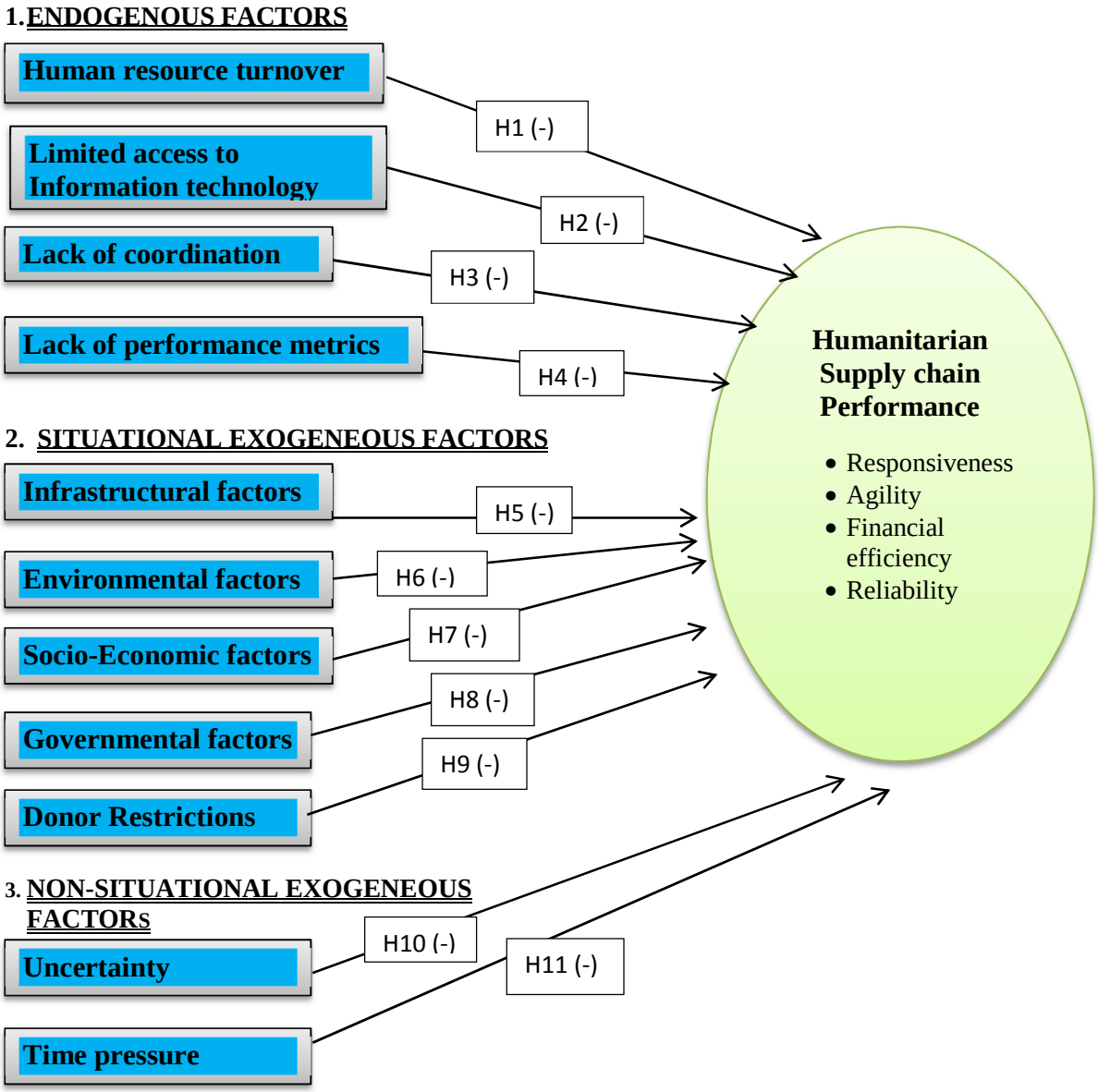

Figure I: Conceptual Framework

Source: Researcher (2020), adapted from Van Wassenhove(2006); Thomas and Kopczak, (2005); Kovacs and Spens(2009); Van der Laan, et al., (2009); Beamon(2004); Lee and Lee (2007) and Samii(2010); Kunz & Reiner(2012); Kovacs and Spens(2007); Beamon(2004); Minear, 1996);Davidson (2006); APICS(2016).

SUMMARY OF HYPOTHESIS

H1:1: Human resource turnover negatively and significantly affects the humanitarian supply chain performance

H0:1: Human resource turnover has no effect on humanitarian supply chain performance.

H1:**2**; Limited access to information technology negatively and significantly affects the humanitarian supply chain performance

H0:**2**: Limited access to information technology has no effect on humanitarian supply chain performance

H1:**3**: Lack of coordination among humanitarian actors negatively and significantly affects the humanitarian supply chain performance

H0:**3**: Lack of coordination among humanitarian actors has no effect on humanitarian supply chain performance

H1:**4**: Lack of performance metrics negatively and significantly affects the humanitarian supply chain performance

H0:4: Lack of performance metrics has no effect on Humanitarian Supply Chain Performance

H1:5: Infrastructural factor negatively and significantly affects the humanitarian supply chain performance

H0:5: Infrastructural factor has no effects on humanitarian supply chain performance

H1:6: Environmental factor negatively and significantly affects the humanitarian supply chain performance

H0:6: Environmental factor has no effect on humanitarian supply chain performance

H1:7: Socio-economic factor negatively and significantly affects the humanitarian supply chain performance

H0:7: Socio-economic factor has no effect on humanitarian supply chain performance

H1:8: Governmental factor negatively and significantly affects the humanitarian supply chain performance

H0: 8: Governmental factor has no effect on humanitarian supply chain performance

H1:9: Donor restriction negatively and significantly affects the humanitarian supply chain performance

H0:9: Donor restriction has no effect on humanitarian supply chain performance

H1:10: Uncertainty negatively and significantly affects the humanitarian supply chain performance

H0:10: Uncertainty has no effect on humanitarian supply chain performance

H1:11: Time pressure negatively and significantly affects the humanitarian supply chain performance

H0: 11: Time pressure has no effect on humanitarian supply chain performance

Clarification to conceptual framework

- *Responsiveness* attribute of the SCOR level two corresponds to donation-to-delivery time in humanitarian supply chain management (Davidson, 2006; Fritz Institute, 2012; Bolshe. D, 2013).
- *Agility* attribute of the SCOR level two corresponds to flexibility in Humanitarian Supply Chain Management(Fritz Institute,2012; Davidson,2006; Beamon & Balick,2008)

- *Cost and asset utilization* attributes in SCOR level two are consolidated in to *Financial Efficiency*(Fritz Institute, 2012; Davidson, 2006)
- *Reliability* attribute in SCOR level two corresponds to *assessment accuracy.* (Fritz Institute, 2012; Davidson, 2006). Appeal coverage measures the percentage of items delivered and thus it is related to reliability.

2.4 Research Gap

Humanitarian supply chain is the central to disaster relief due to its function to serve as a bridge between disaster preparedness and response as well as between procurement and distribution (Van Wassenhove, 2006). The way that supply chains are operated has a massive impact on the speed and quality of the assistance that can be provided. A number of challenges and determinant factors have been identified by various researchers as affecting humanitarian supply chains. These challenges are in most cases country specific. Also, none of them conducted study on factors affecting the supply chain performance by combining endogenous, exogenous situational factors and exogenous non-situational factors together. Thus, there is need to combine and examine the mentioned three factors that affect humanitarian supply chains in Ethiopian context and their impact on humanitarian supply chain performance.

CHAPTER THREE

METHODS OF THE STUDY

This chapter describes the methods of the study used by the researcher to carry out the research study. It presents the research design, research approach, and target population, data sources, data collection and analysis procedures, reliability and validity tests and finally ethical considerations.

3.1 Background of the Study Area

A. Action-Against-Hunger(AAH)-Ethiopia Mission

Action-Against-Hunger is a non-governmental organization set up in France in 1979 to save lives by combating hunger, diseases and those crises threatening the lives of helpless men, women and children. Responding to the needs of populations affected by natural disasters or armed conflicts and respecting their dignity is central to the mandate of Action-Against-Hunger as an international humanitarian organization.

Action-Against-Hunger began operation in Ethiopia in 1985. In 2018 alone, AAH has reached more than 832,829 people in the country. Currently, the organization intervenes in situations that involve Nutrition and Health, Food security and Livelihoods (FSL); Mental Health & Care Practices (MHCP), Gender and Protection; Water, Sanitation and Hygiene (WASH). Key donors of Action-Against-Hunger are ECHO, BPRM, UNHCR, OCHA, SIDA, EUROP AID and OFDA. The organization has country office located in Addis Ababa and six operational field base offices in Ethiopia located in Gambella, Oromia (Wollega and Borena), Amhara, Harar and Somali Regions.

B. Medecines -Sans-Frontiers (MSF)-SPAIN, Ethiopia Mission

Medecines Sans Frontiers (MSF), also known in English as Doctors without Borders, is an international humanitarian medical non-governmental organization (NGO) of French origin for its projects in conflict zones and in countries affected by epidemic diseases. In more than 70 countries, MSF-SPAIN provides medical humanitarian assistance to save lives and ease the suffering of people in crisis situation. MSF-SPAIN workforce is made up of tens of thousands of health professionals, logistic and administrative staff- most of them hired locally. Private donors provide about 90% of the organizations' funding, while corporate donations provide the rest of giving MSF-SPAIN an annual budget of approximately US$ 1.63 billion.

In Ethiopia, the organization has two separate programs: regular program with which the organization undertakes its regular operations in Gambella and Dollo(Somali); and Emergency Unit which has its base at capital office in Addis Ababa to respond to sudden disasters when they occur in the country and also emergency team deployed in the disaster areas to closely monitor the situation, report to the country office the quantity and the type of aid requirement for the victims and also support in the distribution of aid supplies for the beneficiaries. MSF-SPAIN has enormously responded to emergency situations and IDP that happened in Ethiopia recently in Gedeo, Guji, Wollega and Gumuz.

These two humanitarian organizations were operating in Ethiopia for more than two decades responding to multitude of emergencies and undertaking developmental programs. So, what does the existing humanitarian supply chain management systems in these two

organizations look like and the critical factors affecting humanitarian supply chains of AAH and MSF-SPAIN? This question would be addressed by this study.

3.2 Research Design

De Vos and Fouche (1998) defined a research design as the blue print or detailed plan of how a research study is to be conducted. This is of crucial importance because it determines the success or failure of the research, it guides with the logical arrangements for the collection and analysis of data so that conclusions may be drawn.

In this study, the researcher employed both descriptive and explanatory research designs. Descriptive research design helps the researcher to describe phenomena in terms of attitude, values and characteristics (Mugenda & Mugenda, 2003). Kothari (2007) defines descriptive research studies as those which are concerned with describing the characteristics of a particular individual or of a group. This approach will be appropriate for this study since the research sought to describe the perception of employees of MSF-Spain and AAH.

The researcher employed explanatory research design to identify the cause and effect relationship between independent variables: endogenous factors, situational exogenous factors and non-situational exogenous factors) and dependent variable: humanitarian supply chain performances of AAH and MSF-Spain.

3.3 Research Approach

A mixed research approach that involves quantitative and qualitative methods was used in this study. First, the researcher distributed questionnaire to collect the qualitative data from respondents in the form of Likert scale. Then, the scale responses were quantitatively analyzed

to explain cause and effect relationship between dependent and independent variables. Creswell (2003) defined quantitative approach as “one in which the investigator primarily uses post-positivist claims for developing knowledge(i.e., cause and effect thinking, reduction to specific variables and hypotheses and questions, use of measurement and observation, and the test to theories), employs strategies of inquiry such as experiments and surveys, and collects data on predetermined instruments that yield statistical data”. A survey research design and standard instruments was used to measure the research variables namely endogenous factors, exogenous situational factors and exogenous non-situational factors and humanitarian supply chain performance.

Regarding the time dimension, this research study was cross-sectional where information was obtained from a single group of respondents at a single point in time. A broad section of the two organizations employees were asked a series of questions via a survey instrument. A survey approach best suites this study as it involves individuals as the unit of analysis. The major advantage of survey is that it provides extensive information on larger respondent groups in a cost-effective manner (Bryman and Bell, 2009; Zikmund, 1997).

A survey was used to collect original data for describing a population too large to observe directly (Mouton, 1996). A survey obtains information from a sample by means of self-report, that is, people respond to a series of questions posed by the investigator (Polit and Hungler, 1993). The dependent variable is humanitarian supply chain performance while the independent variables are the three factors affecting humanitarian supply chain performance.

3.4 Target Population

Burns and Grove (2001) define population as all the elements (individuals, objects and events) that meet the sample criteria for inclusion in a study. The population of this study consisted of all employees of AAH and MSF-Spain involved in logistics and supply chain management who are employed to the organizations on permanent basis. In order to capture a balanced report, the research focused on supply chain officers, purchasers, logistics managers, assistant base logisticians, store/warehouse clerks as well as program managers, information technology and pharmacy staffs assuming that the respondents have thorough knowledge and are directly involved in the humanitarian supply chain of the organizations.

The total population assessed under this study was 51, which is comprised of 36 staff from AAH and 15 staff from MSF-Spain. The existing population size of MSF-Spain is limited, as the organization has downsized its emergency operations followed by reduction in work force. With regard to sampling method, the study did not undertake rigorous statistical sample size calculation rather considered census method due to the limited population size of the study. Because they are large and complete, censuses are precise, detailed and reliable.

3.5 Data Sources and Types

To conduct this study, both primary and secondary sources of data were used. Primary information on the factors affecting humanitarian supply chain management of AAH and MSF-Spain was solicited through questionnaire that was collected from the sample respondents/employees. Secondary data was gathered from books, journals, documents and other publications related to the topic under investigation so as to establish conceptual

framework and to assist the analysis of the humanitarian supply chain performances of AAH and MSF-Spain.

3.6 Data Collection Procedures

Questionnaires were developed to gather relevant, accurate, sufficient, and reliable information pertaining to factors affecting humanitarian supply chain performance. A structured questionnaire was considered to be the most appropriate data collection instrument for survey research (Askia, 1999). Hence, structured questionnaire which consists of closed-ended questions with a 5 points Likert scale was used. A 5 points scale is found to be more reliable and valid than shorter or longer scales (Krosnick & Fabrigar, 1997). Thus, in this study a five point rating scale was used to measure responses of employees asking the respondents to give their opinions by ticking option 1 for “Strongly Disagree”, 2 for “Disagree”, 3 for “Neutral”, 4 for “Agree” and 5 for “Strongly Agree.

The questionnaire has been divided into four sections, Section I, II, III and IV. Section I of the questionnaire consisted of six questions seeking general information about the demographic characteristics of respondent which included the age, the gender, the level of education, and the number of years they have worked in AAH and MSF-Spain; department/work unit in which they are working and the name of the employer organization.

Section II of the questionnaire consists of 38 statements related to the four variables (procurement, inventory management, transport management and warehouse/location management) practices of AAH and MSF-Spain. Section III of the questionnaire consists of 44 statements related to the three factors (Endogenous factors, exogenous situational and exogenous situational factors) affecting humanitarian supply chain performance.

Section IV consists of 11 statements that relate to overall effect of the eleven variables on HSC performance. Finally, section V consists of 48 statements related to the current humanitarian supply chain performance of AAH and MSF-Spain.

3.7 Data Analysis

"Data analysis consists of examining, categorizing, tabulating, or otherwise recombining the evidence to address the initial propositions of a study" (Yin, 1994). There are several key features of analysis that can be identified for the purpose of data analysis. The qualitative data that was collected from respondents through the questionnaire in the form of Likert scale was quantitatively analyzed. Tables were used to summarize and give a clear view of the distribution of the responses given by the respondents to each question in the questionnaire. SPSS version 20.0 was used to help in the computing of the quantitative data.

A bivariate correlation method (Karl-Pearson's correlation coefficient) was computed to see associations between three factors consisting of eleven variables affecting humanitarian supply chain performance of AAH and MSF-Spain. Besides, a multiple regression analysis was used to measure the relative importance of the major variables of humanitarian supply chain management system in estimating humanitarian supply chain performance of AAH and MSF-Spain. In addition, a confidence level of 95% with p-value < 0.05 is significant for all analysis results.

3.8 Reliability Test

According to Shanghverzy (2003), reliability refers to the consistency of measurement and is frequently assessed using the test–retest reliability method. Reliability is increased by including many similar items on a measure, by testing a diverse sample of individuals and

by using uniform testing procedures. Reliability is also concerned with the question of whether the results of a study are repeatable. The term is commonly used in relation to the question of whether the measures that are devised for concepts in business are consistent.

In order to check reliability of the constructs in each variable and factors affecting humanitarian supply chain performance, the study used Cronbach's alpha methodology, which is measure of internal consistency. Cronbach's alpha measures the average of measurable items and its correlation. Overall scales' reliability was tested by Cronbach's alpha, which should be above the acceptable level of 0.70 (Hair et al., 1998).

Table I: Alpha coefficient of actual test based on 47 respondents

Variables	**Number of items**	**Cronbach's**
Humanitarian Supply Chain Performance	11	0.897
Human Resource turnover	4	0.791
Lack of performance metrics	4	0.883
Lack of coordination	4	0.951
Limited access to IT	4	0.879
Degraded Infrastructure	4	0.837
Environmental Factors	4	0.965
Socio-Economic Factors	4	0.980
Governmental Factors	4	0.918
Donor Restrictions	4	0.920
Uncertainty	4	0.941
Time Pressure	4	0.874

(Source: Research Data, 2020)

According to George and Mallery Cronbach's (1951) Alpha reliability coefficient normally ranges between 0 and 1. The closer Cronbach's alpha coefficient is to 1.0, the greater the internal consistency of the items in the scale. The writer provides the following rule of thumb:' ≥.9=excellent; ≥.8good; ≥.7 acceptable≥.6 questionable; ≥.5 poor; and≤.5 unacceptable.

Reliability tests were undertaken and the Cronbach's Alpha values obtained for each independent variable are presented in **table I** above**.**

When we look at **table I,** the Cronbach's Alpha for independent variables vary from socio-economic factors (.980) to human resource turnover (.791). All computed Cronbach's alpha's values are >.7 and are acceptable.

3.9 Validity Test

Validity refers to the degree to which a study accurately reflects or assesses the specific concept that the researcher is attempting to measure. It is the degree to which results obtained from the analysis of data actually represent the phenomenon under study. To enhance the instrument's validity, the researcher sought expert opinion by consulting the supply chain experts in respect to content validity. After the final confirmation, a pilot test was conducted by distributing the questionnaire among 10 respondents from different colleagues of the researcher experienced on the humanitarian supply chain, which could ensure that the questionnaire was appropriate and the aspects to be investigated were generally understandable.

3.10 Ethical Considerations

Ethical issue arises at various stages in business research. According to Leedy and Ormrod (2010), there are four categories of most ethical issue in research: protection participants from harm, informed consent, right to privacy and honesty. Therefore, maximum care was exercised not to expose research participants to unnecessary harm in any form. All the participants were well communicated about the nature and objectives of the study in advance. Participants were encouraged to participate with full enthusiasm by respecting their right of privacy through keeping their responses confidential. Also, participants were

assured that the responses obtained through this study would be used only for the academic purpose. Finally, findings of the research were presented without intentional misrepresentation and misleading to others. The works of other scholars, related to the area and being used in the study had been properly acknowledged.

CHAPTER FOUR

FINDINGS AND DISCUSSIONS

This chapter covers the analysis and discussion of two major parts. Part one involves the descriptive analysis of the demographic characteristics of sample population involved in the study. Hence, the respondents are discussed in terms of gender and age, years of service, educational level, the organization and department in which they work.

Part two deals with the analysis of the findings of the study in light of the theoretical background stated in chapter II. This part involves descriptive report of the responses provided by the respondents regarding the humanitarian supply chain practices and performances; statistical analysis of the three factors with (11 major variables) using Pearson's Correlation, multiple regressions and the reliability test for the actual study. A total of 51 questionnaires were distributed out of which 47 completed questionnaires were returned. This represented a response rate of 92.16%, which is valid and used for analysis. The collected data were analyzed using SPSS (version 20) statistical software.

4.1 Characteristics of the respondents

Based on the responses obtained, as shown in table II, the characteristics of the respondents were examined in terms of gender, age, years of service ,educational level, the organization and work unit in which they work.

Table II- Item A and B reveal gender and age distribution of the sample population of respondents, respectively. Respondents who account for 83.0 % were male respondents. Female representation in this study was 17.0 %. Therefore, majority of the respondents were male.

As regards age, it can easily be understood that the workforce population is largely dominated by the age group 31-40 comprising 74.50 %. However, the least group respondents were 21-30 years old which only covers 8.5 % of the sample population. On the other hand, 8 respondents (17.0%) were in the range of 41-50 years old.

Respondents, as employees of Action-Against-Hunger and Medecins Sans Frontiers (MSF-Spain) have been working there for a diversified number of years. As indicated in Table I, Item C, respondents who had length of service 5 years and above category made up the majority which comprised 37(78.70 % of the entire sample), followed by 8 (17.0%) of respondents who served 1-3 years in the organizations. However, only 2 respondents accounting for 4.3 % had 3-5 years of experience in the organizations. It would, therefore, be possible to generalize that such a relatively longer year of services might have helped the respondents to possess rich experience and better understanding about the various issues related to humanitarian supply chain management performance of Action-Against-Hunger and Medecins Sans Frontiers (MSF-Spain).

It was also the matter of concern for this study to examine the educational distribution of the respondents. As it has been seen from Table II, Item D, 32 respondents (68.1%) had first degrees which dominate the sample, 12 respondents (25.5%) had master degree. Only 3 respondents (6.4 %) had diploma.

Respondents were also asked to indicate the department/work unit in which they are working. As depicted in table II-item E, 25 respondents (53.20%) were logistics/supply chain staff whereas 22 respondents (46.80%) were from program unit. Thus, it can be suggested that data collected from the respondents is balanced as supply/logistics and program staff are directly involved in humanitarian supply chain of both organizations.

Table II: Respondents' characteristics by gender, age, year of service, educational level, organization and work unit

Item	Frequency(n)	Percentage (%)
A. Gender		
Male	39	83.00%
Female	8	17.00%
Total	47	100.00
B. Age		
Below 21 years	-	-
21-30 years	4	8.50 %
31-40 years	35	74.50 %
41-50 years	8	17.00%
Above 50 years	-	-
Total	47	100.00%
C. Years of service		
Less than a year	-	-
1-3 years	8	17.00%
3-5years	2	4.30%
Above 5 years	37	78.70%
Total	47	100.00%
D. Educational level		
Below Diploma	-	-
Diploma	3	6.40%
BA/BSC	32	68.10%
MA/MSC	12	25.50%
Total	47	100.00%
E. Department/Work Unit		
Logistics and supply	25	53.20%
Program	22	46.80%
IT	-	-
Finance	-	-
Total	47	100.00%
F. Employer Organization		
Action-Against-Hunger	34	72.30%
Medecins-Sans-Frontiers	13	27.70%
Total	47	100.00%

(Source: Research Data, 2020)

Finally, respondents were also asked to indicate their respective organization they have been working in. As presented in table-II item F, 34 respondents (72.30 %) were from

Action-Against-Hunger and 13 respondents (27.70%) were from Medecins-Sans-Frontiers (MSF-Spain). It can be suggested that respondents from different humanitarian organizations can have different practices, experience and knowledge in HSCM and they would provide an independent view of humanitarian supply chain specific factors and HSC performance.

4.2 Descriptive Analysis of Humanitarian Supply Chain Management Practices

In the course of descriptive data analysis, averages (mean) were calculated for each construct in the Likert Scales, from Strongly Disagree=1 to Strongly Agree=5. The numbers entered in to the SPSS thus represented the weight and thus the weighted averages for the scales were calculated to understand the mean values. This was accomplished by dividing the distances between the scale values (4 in a 5-point Likert Scale by the number of values (5). Thus, the period length is 4/5=0.80, which is used to calculate the weighted averages (Alfarra, W.A., 2009).

The weighted average categories for each result are shown in **table III** below and each result is interpreted with the degree of agreement for each factor calculated accordingly.

Table III: Weigh**t**ed Averages for 5-point Likert Scales

Weighted Average	Result	Result Interpretation
1.00-1.79	Strongly Disagree	Very un influential
1.80-2.59	Disagree	Un influential
2.60-3.39	Neutral	Neutral/do not know
3.40-4.19	Agree	Influential
4.20-5.00	Strongly Agree	Very Influential

(Source: Alfarra, W.A., 2009)

4.2.1 Procurement Practices of AAH and MSF-Spain

Respondents were asked to give their opinion on what they thought the current procurement practice of AAH and MSF-Spain looks like. The five point Likert scale was used by the researcher to acquire direct response from the respondents and the mean score and standard deviation is presented in the **table IV**.

As it can be seen from the table, both AAH and MSF-Spain have the practices of conducting initial need assessment shortly after the disaster strikes (mean=3.66); quantifying the relief supplies required to meet needs of the affected population (mean=4.02); reviewing the need for relief supplies to identify the stock of prepositioned supplies in the warehouse before determining the quantity of relief items to be procured from suppliers (mean=4.02); and preparing purchase request for the items that need to be procured from suppliers(mean=4.74). This is in line with Thomas(2003) and Balcik & Beamon(2008) who claimed that after a disaster strikes, relief organizations conduct an initial assessment (usually within one day after occurrence).The expected quantity of supplies required to meet the relief needs of the affected population is estimated as well as pre-positioned supplies, already available at the organizations warehouses, are evaluated. Relief items, which need to be procured from suppliers, are then determined.

Similarly, the organizations have the practices of preparing request for quotation to get price quotes from suppliers as per the required specification (mean=4.55); conducting comparative bid analysis to identify the successful supplier based on the predefined selection criteria (mean=4.26); placing purchase order to procure the relief supplies from successful suppliers (mean=4.40).

Table IV: Procurement Practice in AAH and MSF-Spain (N=47)

Procurement Practices	Mean	Std. Deviation
1. The organization has the practices of conducting initial need assessment shortly after the disaster strikes	3.66	0.891
2. The organization has the practices of quantifying the relief supplies required to meet needs of the affected population	4.02	0.531
3. The organization has the practices of reviewing the need for relief supplies to identify the stock of prepositioned supplies in the warehouse before determining the quantity of relief items to be procured from suppliers	4.02	0.737
4. The organization has the practices of preparing purchase request for the items that need to be procured from ;suppliers	4.74	0.441
5. The organization has the practices of preparing Request for Quotation to get price quotes from suppliers as per the required specification	4.55	0.583
6. The organization has the practice of conducting comparative bid analysis to identify the successful supplier based on the predefined selection criteria	4.26	0.736
7. The organization has the practices of placing purchase order to procure the relief supplies from successful suppliers	4.40	0.577
8. The organization has the practices of negotiation and contract management with suppliers	3.96	0.624
9. The organization effects payment for suppliers after goods are delivered to the warehouse as per the predefined specification and agreed up on terms and conditions	4.15	0.908
10. The organization uses automated system to manage the procurement activities	4.30	0.72
11. The organization measures supplier performance regularly	3.30	0.998
12. The organization maintains long term agreements with potential suppliers in order to improve supply capacity need during disaster occurrence	3.70	0.689
Grand mean	4.09	0.70

(Source: Research Data, 2020)

Moreover, both organizations have the practices of negotiation and contract management with suppliers (mean=3.96); effecting payment for suppliers after goods are delivered to the warehouse as per the predefined specification and agreed up on terms and conditions

(mean=4.15); use automated system to manage the procurement activities (mean=4.30) and maintain long term agreements with potential suppliers in order to improve supply capacity need during disaster occurrence (mean=3.70). However, the organizations hardly practice measuring supplier performance regularly (mean=3.30).

This is in line with Yosef (2018) who stated that humanitarian organizations use procurement manuals, standard operating procedures and guidelines that help them to identify and implement the procurement processes the organizations use to undertake procurement activities. The procurement process(receiving procurement request/procurement line, preparing request for quotation, conducting comparative bid analysis(CBA), preparing purchase order(PO), negotiation and contract management, effecting payment after goods are delivered to warehouse and supporting procurement activities with automated system) are all in line with AAH and MSF standard operating procurement procedures supported by Kit Log and LogistiX 7, respectively.

4.2.2 Inventory Management Practice

Respondents were also asked to give their opinion on what they thought the current inventory management practice of AAH and MSF-SPAIN looks like. The five point Likert scale was used by the researcher to acquire direct response from the respondents and the mean score and standard deviation is presented in the **table V**.

Both AAH and MSF-Spain have the practices of maintaining safety stock of inventory of relief items to quickly respond to disasters when they occur (mean=3.62). This is in line with Balcik & Beamon (2008) and Merminod *et al*., (2014) who claimed that relief organizations stockpile ready-to-dispatch inventory in locations with access to disaster

prone regions and the most effective, most efficient response to any disaster is made possible by intelligent pre-positioning of inventory and optimum allocation of resources.

Table V: Inventory Management Practice in AAH and MSF-Spain (N=47)

Inventory Management Practice	Mean	Std. Deviation
1. The organization maintains safety stock of inventory of relief items to quickly respond to disasters when they occur	3.62	.945
2. The organization has a practice of using Reception Note to receive relief items to the warehouse	4.45	.583
3. The organization has the practice of using Delivery Notes to issue relief items to their destination	4.38	.610
4. The organization uses stock cards to know stock balance of relief items in the warehouse	3.98	.967
5. The organization implements First-In-First-Out inventory management technique to issue items from warehouse	3.72	1.097
6. The organization conducts regular stock count of inventory to determine the balance of relief items on hand	3.89	.787
7. The organization has a procedure for timely disposal of obsolete and expired relief items	3.30	1.082
8. The organization tracks the stock inventory in the warehouse using the automated system	3.26	1.170
Grand mean	3.83	0.91

(Source: Research Data, 2020)

Moreover, both organizations use stock cards to know stock balance of relief items in the warehouse (mean=3.98). This is in line with Business link(2012 and Muller(2011) who claimed that the vital stock control measurements include: establishing levels of operating stocks based on consumption/rate of usage; ensuring that weekly and monthly stock balances reports are done for each stock item.

Both AAH and MSF use standard operating forms line Reception Note to receive relief items to the warehouse (mean=4.45); Delivery Notes to issue relief items to their destination (mean=4.38); they implement First-In-First-Out inventory management technique to issue items from warehouse (mean=3.72) and conduct regular stock count of inventory to determine the balance of relief items on hand (mean=3.89). These procedures are in line with AAH Kitlog & MSF supply guideline, 2014.

Nevertheless, although both organizations have automated system to manage inventory movement, it has been reported that the organizations track the stock inventory in the warehouse using the automated system at minimal level (mean=3.26).

Finally, it is hardly practiced that both organizations have a procedure for timely disposal of obsolete and expired relief items (mean=3.30).

4.2.3 Warehouse Management Practice

Warehouse practices of the two organizations were also assessed. The **table VI** presented below shows the results of the questionnaire on Warehouse practices of AAH and MSF-Spain.

Both AAH and MSF-Spain have practices of locating warehouse facility at strategic places to quickly respond to disasters when they occur (mean=3.85); they have the practices of deciding the size (mean=4.02) and the capacity of the warehouse facilities based on demand (mean=3.94). This is in line with Caunhye, Nie, & Pokharel (2012) who claimed that facility location concerns the placement of facilities considering several characteristics such as demand, size and location. It is also in line with KaMinsky & Simchi-Levi (2008)

who stated that facility location decisions involve the number, location, size and capacity of each facility.

These considerations also apply to the humanitarian sector (Richardson, Leeuw & Vis, 2010). Facility location decisions have a direct impact on the operating cost and on the timeliness of response to the demand (Haghani, 1996). In order to respond quickly to the onset of a disaster, facility location and stock pre-positioning are therefore key decisions in humanitarian relief (Balcik & Beamon, 2008).

Distributing relief supplies from strategically- located warehouses improves the efficiency of disaster relief in economic terms, but also in terms of transportation efficiency, speed and demand satisfaction (Döyen, Aras & Barbarosoğlu, 2012). In humanitarian supply chains, this may translate into minimizing transportation cost (Drezner, 1995) and delivery time (Akkihal, 2006).

Both organizations have procedure for receiving relief supplies to warehouse after they are procured (mean=4.23), putting away of procured relief supplies in the warehouse (mean=3.83), packaging the relief supplies to protect the relief items from damage (mean=3.81) and dispatching relief items to disaster areas (mean=4.11) as per AAH Kitlog and MSF LogistiX 7 guidelines.

Moreover, the organizations have the practices of optimizing storage space (mean=3.77) and storing materials in designated places for latter tracing (mean=3.74) and use material handling equipment to load/unload the relief items (mean=3.51). These results are also as per the standard warehouse operating procedure developed by both organizations.

Table VI: Warehouse Management Practice in AAH and MSF-Spain (N=47)

Warehouse Management Practice	Mean	Std. Deviation
1. The organization locates warehouse facility at strategic places to quickly respond to disasters when they occur	3.85	1.021
2. The organization has the practices of deciding the size of the warehouse facilities based on demand	4.02	.794
3. The organization has the practices of deciding the number of warehouse facilities based on demand	3.74	.896
4. The organization has the practices of deciding the capacity of the warehouse facilities based on demand	3.94	.919
5. The organization has the practices of receiving relief supplies to warehouse after they are procured	4.23	.633
6. The organization has the practices of put away of procured relief supplies in the warehouse	3.83	.816
7. The organization has the practice of packaging the relief supplies to protect the relief items from damage	3.81	1.014
8. The organization has the practices of dispatching relief items to disaster areas	4.11	.814
9. The organization has the practices of optimizing storage space	3.77	.914
10. The organization has the practices of using material handling equipment to load/unload the relief items	3.51	.997
11. The organization has the practices of storing materials in designated places for latter tracing	3.74	.988
Grand mean	3.87	0.89

(Source: Research Data, 2020)

4.2.4 Transportation Management Practice

Table VII below reveals the respondents opinion of what transportation management practice of AAH and MSF-Spain looks like in distributing relief supplies to disaster beneficiaries.

Table VII: Transportation Management Practice of AAH and MSF-Spain (N=47)

Transportation Management Practice	Mean	Std. Deviation
1. The organization has the practices of determining transport modes to deliver the relief supplies to affected area	4.28	.713
2. The organization has the practices of deciding load capacity to fully utilize the transport facility to move relief supplies to their destination	3.72	.649
3. The organization has the practices of scheduling the transportation of relief supplies to beneficiaries	3.77	.758
4. The organization has the practices of routing the transportation of relief supplies to their destination	4.06	.763
5. The organization has the practices of tracking the movement of transport facilities while travelling to their destination	3.98	.737
6. The organization has the practices of accompanying the freight with the waybill to ensure the legality of the consignment	4.51	.585
Grand mean	4.05	0.70

(Source: Research Data, 2020)

As it can be seen from the table, AAH and MSF-Spain have practices of determining transport modes to deliver the relief supplies to affected area (mean=4.28); the organizations have the practices of deciding load capacity to fully utilize the transport facility to move relief supplies to their destination (mean=3.72); scheduling the transportation of relief supplies to beneficiaries (mean=3.77) and routing the transportation of relief supplies to their destination (mean=4.06). This is in line with Pettit & Beresford

(2009) who stated that transport is critical in disaster relief and an important aspect of humanitarian logistics is the requirement to address mode, utilization of capacity, scheduling, and maintenance in such circumstances.

Moreover, both organizations have practices of tracking the movement of transport facilities while travelling to their destination (mean=3.98) and accompanying the freight with the waybill to ensure the legality of the consignment (mean=4.51) and these are in line with AAH and MSF operating transportation management procedures.

4.2.5 Humanitarian Supply Chain Performance

The data was also collected to analyze the current supply chain performance of AAH and MSF-Spain from procurement, inventory management, and transport and warehouse management points of view in light of SCOR metrics level two performance attributes of flexibility, cost, reliability and responsiveness (Frinz Institute, 2012).

To this end, the respondents were asked to give their opinion on 5-point likert scale measurement whether the current humanitarian supply chain performance of AAH and MSF-Spain is flexible, cost efficient, reliable and responsive.

4.2.5.1 Procurement Performance of AAH and MSF-Spain

The data collected was analyzed with reference to each of the construct in the procurement performance and the result of the responses obtained from the respondents is displayed in the table below.

As it can be seen from the table, the procurement/sourcing practice of the organizations ensure best value for money (mean=3.49); the delivery of relief items at the lowest total acquisition cost (mean=3.60) and ensures the lowest operating costs (mean=3.57).

Table VIII: Procurement Performance of AAH and MSF-Spain (N=47)

Humanitarian supply chain performance of AAH and MSF-Spain from procurement performance point of view	Mean	Std. Deviation
FLEXIBILITY		
FL1. The sourcing /procurement practice of the organization is flexible in terms of time to respond to disasters	3.28	0.926
FL2. Procurement /sourcing practice of the organization is flexible in terms of volume to respond to different magnitude of disasters	3.23	0.960
FL3. The sourcing/procurement practice of the organization is flexible in terms of mix of different types of relief items it can provide during a particular disaster occurrence	3.34	0.731
Mean value for flexibility	3.28	0.870
COST		
C1. The procurement/sourcing practice of the organization ensures best value for money	3.49	0.953
C2. The procurement/sourcing practice of the organization ensures the delivery of relief items at the lowest total acquisition cost	3.60	0.681
C3. The procurement/sourcing practice of the organization ensures the lowest operating costs	3.57	0.683
Mean value for cost	3.55	0.770
RELIABILITY		
REL1. The procurement practices of the organization ensures on-time delivery of aid supplies to beneficiaries	2.81	0.992
REL2. The procurement practice of the organization ensures the right quantity of aid supplies delivered to beneficiaries	3.72	0.579
REL3. The procurement practice of the organization ensures the right quality of aid supplies to beneficiaries	3.79	0.414
Mean value for reliability	3.44	0.660
RESPONSIVENESS		
RES1. The procurement practice of the organization ensures the shortest donation-to-delivery time to deliver aid supplies to beneficiaries	2.94	0.965
RES2. The procurement practice of the organization ensures the shortest order-to-delivery cycle time to deliver aid supplies to beneficiaries	2.87	0.924
RES3. The procurement practice of the organization ensures the shortest order fulfillment cycle time to deliver aid supplies to beneficiaries	2.91	0.952
Mean value for Responsiveness	2.91	0.950
Grand mean for procurement performance	**3.30**	**0.81**

(Source: Research Data, 2020)

The procurement practices of the organization ensures the right quantity of aid supplies delivered to beneficiaries (mean=3.72) and the right quality of aid supplies to beneficiaries (3.79); but does not ensure on-time delivery of aid supplies to beneficiaries (mean=2.81).

Similarly, the procurement practices of the organizations neither ensures the shortest donation-to-delivery time (mean=2.94); the shortest order-to-delivery cycle time (mean=2.87) nor the shortest order fulfillment cycle time to deliver aid supplies to beneficiaries (mean=2.91).

Moreover, is has been reported that the sourcing /procurement practice of the organizations is not flexible in terms of time to respond to disasters (mean=3.28); volume to respond to different magnitude of disasters (mean=3.23) and mix of different types of relief items it can provide during a particular disaster occurrence (mean=3.34).

Overall, procurement performance of the organizations has been reported as reliable (mean=3.44) and cost efficient (mean=3.55) but not flexible (mean=3.28) and responsive (mean=2.91).

4.2.5.2 Inventory Management Performance

Respondents were asked to give their opinion on the current inventory management performance of AAH and MSF-Spain. The five point Likert scale was used by the researcher to acquire direct response from the respondents and the mean score and standard deviation is presented in the **table IX**.

Table IX: Inventory Management Performance of AAH and MSF-Spain (N=47)

Humanitarian supply chain performance of AAH and MSF-Spain from inventory management performance point of view	Mean	Std. Deviation
FLEXIBILITY		
FL1. The inventory management of the organization is flexible in terms of time to respond to disasters	3.85	0.751
FL2. Inventory management of the organization is flexible in terms of volume of relief supplies to respond to different magnitude of disasters	3.68	0.862
FL3. The inventory management of the organization is flexible in terms of mix of different types of relief items it can provide during a particular disaster occurrence	3.77	0.914
Mean value for flexibility	3.77	0.84
COST		
C1. The inventory management of the organization ensures effective asset utilization	3.81	0.741
C2. The inventory management of the organization ensures the lowest inventory carrying costs	3.64	0.942
C3. The inventory management of the organization ensures that the cost of obsolescence of relief items is minimized	3.77	0.865
Mean value for cost	3.74	0.85
RELIABILITY		
REL1. Inventory management of the organization ensures delivery of damage free relief items	3.21	0.954
REL2. Inventory management of the organization ensures that the right quantity of the relief items are delivered to the affected area	3.91	0.686
REL3. Inventory management of the organization ensures that the right quality of the relief items are delivered to the affected area	3.79	0.69
Mean value for reliability	3.64	0.78
RESPONSIVENESS		
RES1. Inventory management of the organization ensures the shortest donation-to-delivery time to deliver relief supplies	3.87	0.875
RES2. Inventory management of the organization ensures the pre-positioning of relief supplies to quickly respond to disasters	3.68	0.663
RES3. The inventory management of the organization ensures the shortest order fulfillment cycle time	3.87	0.679
Mean value for reliability	3.81	0.74
Grand mean Inventory Management Performance	**3.74**	**0.80**

(Source: Research Data, 2020)

As it is portrayed in the table, the inventory management of the organizations is flexible in terms of time to respond to disasters (mean=3.85); volume of relief supplies to respond to different magnitude of disasters (mean=3.68) and mix of different types of relief items it can provide during a particular disaster occurrence (mean=3.77). It also ensures effective asset utilization (mean=3.81); the lowest inventory carrying costs (mean=3.64) and minimize the cost of obsolescence of relief items (mean=3.77).

Inventory management of the organizations also ensures that the right quantity (mean=3.91) and the right quality of the relief items are delivered to the affected area (mean=3.79) but hardly ensures delivery of damage free relief items to beneficiaries (mean=3.21).

Moreover, inventory management of the organizations ensures the shortest donation-to-delivery time to deliver relief supplies (mean=3.87); the pre-positioning of relief supplies to quickly respond to disasters (mean=3.68) and the shortest order fulfillment cycle time (mean=3.87).

Overall, as per the responses obtained from the respondents, it has been noted that inventory management performance of the organizations is flexible (mean=3.77), reliable (mean=3.64), responsive (mean=3.81) and cost efficient (mean=3.74).

4.2.5.3 Transportation Management Performance

Respondents were also asked to give their opinion on the current transport management performance of AAH and MSF-Spain. The five point Likert scale was used by the researcher to acquire direct response from the respondents and the mean score and standard deviation is presented in the **table X**.

Table X: Transport Management Performance of AAH and MSF-Spain (N=47)

Humanitarian supply chain performance of AAH and MSF-Spain from transport management performance point of view	Mean	Std. Deviation
FLEXIBILITY		
FL1. The transportation management of the organization is flexible in terms of the time to respond to disaster occurrence	3.83	0.637
FL2. The transportation management of the organization is flexible in terms of volume of relief items to transport to disaster areas	3.91	0.408
FL3. The transportation management of the organization is flexible in terms of mix of different relief items to transport to disaster areas	3.94	0.485
Mean value for flexibility	3.89	0.51
COST		
C1. The transportation management of the organization ensures delivery of aid supplies to beneficiaries at the lowest total transportation and distribution costs	3.74	0.846
C2. The transport management of the organization ensures the lowest repair and maintenance costs	3.79	0.69
C3. The transportation management of the organization ensures the lowest demurrage costs	4.04	0.588
Mean value for cost	3.86	0.71
RELIABILITY		
REL1. The transportation management of the organization ensures on-time delivery of aid supplies to beneficiaries	4.09	0.654
REL2. The transportation management of the organization ensures the delivery of the right quantity of aid supplies listed on the packing list to beneficiaries free of discrepancy	3.96	0.509
REL3. The transportation management of the organization ensures damage free delivery aid supplies to beneficiaries	3.77	0.786
Mean value for Reliability	3.94	0.65
RESPONSIVENESS		
RES1. The transportations management of the organization ensures the shortest donation-to-delivery time to deliver relief supplies	3.70	0.72
RES2. The transportations facilities of the organization are adequate to quickly respond to disasters	3.77	0.786
RES3. The transportation management of the organization ensures the shortest order fulfillment cycle time	3.55	0.974
Mean value for Responsiveness	3.67	0.83
Grand mean for Transportation Management	**3.84**	**0.67**

(Source: Research Data, 2020)

The transportation management of the organizations is flexible in terms of the time to respond to disaster occurrence (mean=3.83); volume of relief items to transport to disaster areas (mean=3.91) and mix of different relief items to transport to disaster areas (mean=3.94).

It ensures delivery of aid supplies to beneficiaries at the lowest total transportation and distribution costs (mean=3.74); repair and maintenance costs (mean=3.79) and demurrage costs (mean=4.04).

The transportation management of the organizations ensure on-time delivery (mean=4.09) ; the right quantity (mean=3.96) and damage free delivery of aid supplies to beneficiaries (mean=3.77).

Moreover, the transportation management of the organizations ensures the shortest donation-to-delivery time to deliver relief supplies (mean=3.70); are adequate to quickly respond to disasters (mean=3.77) and ensures the shortest order fulfillment cycle time (mean=3.55).

Overall, as per the response provided by the respondents, transportation management system of the organizations is flexible (mean=3.89), cost-efficient (3.86), reliable (3.94) and responsive (3.67).

4.2.5.4 Warehouse Management Performance

As it can be seen from **table XI,** The warehouse/facility location of the organizations ensure flexibility in terms of time (mean=3.70); capacity (mean=3.62) and size to respond to disasters (mean=3.55).

Table XI: Warehouse Management Performance of AAH and MSF-Spain (N=47)

Humanitarian supply chain performance of AAH and MSF-Spain from warehouse management performance point of view	Mean	Std. Deviation
FLEXIBILITY		
FL1. The warehouse/facility location of the organization ensures flexibility in terms of time to respond to disasters	3.7	0.778
FL2. The warehouse/facility location of the organization ensures flexibility in terms of capacity to respond to disasters	3.62	0.709
FL3. The warehouse/facility location of the organization ensures flexibility in terms of size to respond to disasters	3.55	0.775
Mean value for flexibility	3.62	0.75
COST		
C1. The warehouse management of the organization ensures the lowest total material handling costs	3.79	0.75
C2. The warehouse management of the organization ensures the lowest warehouse costs	3.89	0.561
C3. The warehouse management of the organization ensures the lowest asset utilization costs	3.74	0.765
Mean value for cost	3.81	0.69
RELIABILITY		
REL1. The warehouse management practice of the organization ensures on-time delivery of aid supplies to beneficiaries	4.00	0.86
REL2. The warehouse management practice of the organization ensures the right quantity of aid supplies delivered to beneficiaries	3.98	0.571
REL3. The warehouse management practice of the organization ensures the damage free delivery of aid supplies to beneficiaries ensured through appropriate packaging	3.83	0.732
Mean value for Reliability	3.94	0.72
RESPONSIVENESS		
RES1. The warehouse management practice of the organization ensures the shortest donation-to-delivery time to deliver aid supplies to beneficiaries	3.49	0.906
RES2. The warehouse management practice of the organization ensures the shortest order-to-delivery cycle time to deliver aid supplies to beneficiaries	3.64	0.735
RES3. The warehouse management practice of the organization ensures the shortest order fulfillment cycle time	3.6	0.681
Mean value for Responsiveness	3.58	0.77
Grand mean for Warehouse Management performance	**3.74**	**0.74**

(Source: Research Data, 2020)

The warehouse management of the organization ensures the lowest total material handling costs (mean=3.79); warehouse costs (mean=3.89) and asset utilization costs (mean=3.74).

The warehouse management practice of the organizations ensure on time delivery (mean=4.00); the right quantity (mean=3.98) and the damage free delivery of aid supplies to beneficiaries (mean=3.83).

Moreover, the warehouse management practice of the organizations ensure the shortest donation-to-delivery time (mean=3.49); order-to-delivery cycle time (mean=3.64) and order fulfillment cycle time (mean=3.60).

Overall, as per the response provided by the respondents, warehouse management system of the organizations is flexible (mean=3.62), cost-efficient (3.81), reliable (3.94) and responsive (3.58).

4.2.5.5 Summary of Humanitarian Supply Chain Performance of AAH and MSF-Spain

Table below shows the summary of humanitarian supply chain performance of AAH and MSF-Spain. The mean values of each performance dimensions (flexibility, cost, reliability and responsiveness) were calculated for each supply chain practice (procurement, inventory management, and warehouse and transport management.)

As it can be seen from the above table, the overall supply chain performance of AAH and MSF is flexible (mean=3.64); cost efficient (mean=3.74); reliable (mean=3.74) and responsive (mean=3.49). The grand mean value=3.65 is also above the cut-off point of 3.39 on the 5-point Likert Scale. Thus, it can be concluded that the overall humanitarian supply chain performances of AAH and MSF-Spain are very good.

Table XII : Summary of HSC performance of AAH and MSF-Spain (N=47)

	Summary of supply chain performance of AAH and MSF-Spain	Mean	Std. Deviation
FL	**Flexibility** dimension of Humanitarian supply chain performance	3.64	0.74
CO	**COST** dimension of Humanitarian supply chain performance	3.74	0.76
REL	**Reliability** dimension of Humanitarian supply chain	3.74	0.70
RES	**Responsiveness** dimension of Humanitarian supply chain	3.49	0.82
	Grand Mean of HSCM performance	**3.65**	**0.76**

(Source: Research Data, 2020)

4.3 Inferential analysis of factors affecting humanitarian supply chain performance

4.3.1 Factor Analysis

Principal components analysis (PCA) is a statistical technique used to discover which items in a set form factors that are largely independent of one another. It is used to summarize and reduce a large set of items into a smaller number of factors. Factors may be extracted or fixed by the researcher, and rotation is used to increase interpretability (Tabachnick & Fidell, 2007).

For each scale used in the study, PCA with varimax rotation was used to obtain the underlying factor structure of each measurement scale. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was calculated to indicate whether factor analysis was an appropriate analysis and should result in distinct and reliable factors. Values less than .50 indicate the data are not acceptable for factor analysis. Values between .50 and .70 are mediocre. Values of .70 to .80 are good. Values between .80 and .90 are great, and values above .90 are considered superb (Kaiser, 1974). Bartlett's test of sphericity tests the null hypothesis that the correlations in the correlation matrix are zero. For adequate factor

analysis, Bartlett's test should be significant indicating the correlation matrix is not zero and there is some relationship between the variables (Tabachnick & Fidell, 2007).

4.3.1.1 Endogenous Factors Scale

The final solution for the 16-item endogenous factor scale consisted of 4 variables that explained 68.70 % of the variance. The value of KMO was .687 and Bartlett's test of sphericity was significant ($\chi 2 = 53.93$, $df = 6$, $p < .005$) indicating factor analysis was appropriate for the data. A threshold of .45 was selected for the factor loadings due to the small sample size (Stevens, 1992); typically factor loadings above .3 may be significant in a large sample and factor loadings as high as .7 may be needed to have significance in very small samples. 7 items were removed due to cross loading on more than one factor.

4.3.1.2 Situational Exogenous Factors scale

The final solution for the 20-item situational exogenous factor scale consisted of 5 variables that explained 62.60 % of the variance. The value of KMO was .626 and Bartlett's test of sphericity was significant ($\chi 2 = 110.712$, $df = 10$, $p < .005$) indicating factor analysis was appropriate for the data. A threshold of .45 was selected for the factor loadings due to the small sample size (Stevens, 1992); typically factor loadings above .3 may be significant in a large sample and factor loadings as high as .7 may be needed to have significance in very small samples. 8 items were removed due to cross loading on more than one factor.

4.3.1.3 Non-Situational Exogenous Factors Scale

The final solution for the 8-item non-situational exogenous factor scale consisted of 2 variables that explained 58.1 % of the variance. The value of KMO was .581 and Bartlett's test of sphericity was significant ($\chi 2 = 4.159$, $df = 1$, $p < .005$) indicating factor analysis was appropriate for the data. A threshold of .45 was selected for the factor loadings due to

the small sample size (Stevens, 1992); typically factor loadings above .3 may be significant in a large sample and factor loadings as high as .7 may be needed to have significance in very small samples.

Table XIII: Factor Loading for the eleven variables (N=47)

Factors and variables	Mean	Loading
Factor 1-Endogeneous Factors		
1. Human Resource Turnover	3.4468	0.810
2. Lack of performance metrics	3.2411	0.802
3. Lack of coordination	3.6489	0.758
4. Limited access to information system technology	3.5106	0.729
Factor 2-Situational Exogenous Factors		
1. Infrastructural Factors	3.5957	0.806
2. Environmental Factors	3.5479	0.732
3. Socio-Economic Factors	3.1986	0.812
4. Governmental Factors	3.2340	0.798
5. Donor Restrictions	3.0638	0.732
Factor 3-Non-situational Exogenous Factor		
1. Uncertainty	3.2287	0.806
2. Time pressure	2.9628	0.806

Source: Research Data (2020)

4.3.2 Independent sample t-test (Comparison among groups)

To identify whether there is mean difference between two sample groups (Action-Against-Hunger and Medecines Sans Frontiers), independent sample t-test was conducted using Independent Samples Mann-Whitney U Test. As depicted in the table below, the result shows that there is no mean difference between the two groups.

Table XIV: Independent sample t-test summary

Hypothesis Test Summary				
	Null Hypothesis	**Test**	**Sig.**	**Decision**
1	The distribution of Human Resource Turnover is the same across categories of Employer.	Independent-Samples Mann-Whitney U Test	.550	Retain the null hypothesis.
2	The distribution of Lack of performance metrics is the same across categories of Employer.	Independent-Samples Mann-Whitney U Test	.567	Retain the null hypothesis.
3	The distribution of Lack of coordination is the same across categories of Employer.	Independent-Samples Mann-Whitney U Test	.310	Retain the null hypothesis.
4	The distribution of Limited access to information technology is the same across categories of Employer.	Independent-Samples Mann-Whitney U Test	.081	Retain the null hypothesis.
5	The distribution of Degraded Infrastructure is the same across categories of Employer.	Independent-Samples Mann-Whitney U Test	.112	Retain the null hypothesis.
6	The distribution of Environmental Factors is the same across categories of Employer.	Independent-Samples Mann-Whitney U Test	.257	Retain the null hypothesis.
7	The distribution of Socio-Economic Factors is the same across categories of Employer.	Independent-Samples Mann-Whitney U Test	.069	Retain the null hypothesis.
8	The distribution of Governmental Factors is the same across categories of Employer.	Independent-Samples Mann-Whitney U Test	.601	Retain the null hypothesis.
9	The distribution of Donor Restrictions is the same across categories of Employer.	Independent-Samples Mann-Whitney U Test	.490	Retain the null hypothesis.
10	The distribution of Uncertainty is the same across categories of Employer.	Independent-Samples Mann-Whitney U Test	.860	Retain the null hypothesis.
11	The distribution of Time Pressure is the same across categories of Employer.	Independent-Samples Mann-Whitney U Test	.425	Retain the null hypothesis.
Asymptotic significances are displayed. The significance level is .05.				

Source: Research Data (2020)

Total N	47
Mann-Whitney U	179.000
Wilcoxon W	270.000
Test Statistic	179.000
Standard Error	41.339
Standardized Test Statistic	-1.016
Asymptotic Sig. (2-sided test)	.310

Figure II: Independent Samples Man Whitney U Test

4.3.3 Pearson's Correlation

The researcher used Pearson's correlation to analyze the strength of relationships between independent variables (factors affecting humanitarian supply chain management) and dependent variable (humanitarian supply chain performance) to find out the value of coefficient "r". The "r" value range between -1.0 and 1.0 ($-1 \leq r \leq 1$). The "r" value equal to 0 indicates that there is no relationship between dependent and independent variables. Positive "r" value shows positive relationship and negative "r" value shows negative relationship between the two variables. The strength of relation between dependent and independent variable is shown in the table below:

"r" value	Strength of relationship
0.80-1.00	Very strong
0.60-0.80	Strong
0.40-0.60	Moderate strong relationship
0.20-0.40	Weak relationship
0.00-0.20	Very weak relationship

(Source: Miller 1991)

4.3.4 Correlation Analysis

Table XV: Correlation matrix of negative effect of factors affecting humanitarian supply chain performance

		Negative effect on Humanitarian supply chain performance
Negative effect on Humanitarian supply chain performance	Pearson Sig. (2-tailed) N	1 47
Human Resource Turnover	Pearson Sig. (2-tailed) N	.904** 0 47
Lack of performance metrics	Pearson Sig. (2-tailed) N	.506** 0 47
Lack of coordination	Pearson Sig. (2-tailed) N	.787** 0 47
Limited access to information technology	Pearson Sig. (2-tailed) N	.709** 0 47
Degraded Infrastructure	Pearson Sig. (2-tailed) N	.802** 0 47
Environmental Factors	Pearson Sig. (2-tailed) N	.635** 0 47
Socio-economic factors	Pearson Sig. (2-tailed) N	.776** 0 47
Governmental factors	Pearson Sig. (2-tailed) N	.554** 0 47
Donor restriction	Pearson Sig. (2-tailed) N	.546** 0 47
Uncertainty	Pearson Sig. (2-tailed) N	.467** 0.001 47
Time pressure	Pearson Sig. (2-tailed) N	.553** 0 47

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

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

A. Coefficient of human resource and its negative effect on HSC performance

Table XV portrays that there is strong correlation that human resource turnover negatively affects humanitarian supply chain performance($r=0.904$, $p=0.000$, $p<0.01$). As it can be seen from the table, there is a very strong correlation between the two variables. Accordingly, it is convincing to support the claim that human resource turnover significantly affects humanitarian supply chain performance of AAH and MSF-Spain.

Therefore, the null hypothesis which states that human resource turnover has no effect on humanitarian supply chain performance.is rejected. This is in line with the argument that humanitarian organizations often struggle with attracting, training and withholding skilled staff (Van Wassenhove, 2006; Thomas & Kopczak, 2005) and face human resource difficulties (Antai, Mutshinda and Owusu,2015). High staff turnover rates lead to difficulties in knowledge transfer (Kovacs & Spens, 2009; Van der Laan *et al*., 2009), high employee turnover rate significantly affect performance of humanitarian logistics (Jateni, 2018).

B. Coefficient of lack of performance metrics and its negative effect on HSC performance

The table XV shows that there is moderately strong correlation that lack of performance metrics negatively affects humanitarian supply chain performance($r=0.506$, $p=0.000$, $p<0.01$). From this, it can be understood that lack of performance metrics affects humanitarian supply chain performance of AAH and MSF-Spain.

Therefore, the null hypothesis which states that lack of performance metrics has no effect on humanitarian supply chain performance is rejected. This corresponds to the argument

that lack of standards and performance indicators (Thomas and Kopczak, 2005; Van der Laan *et al*., 2009) impede proper improvement of humanitarian supply chain processes.

C. Coefficient of lack of coordination and its negative effect on HSC performance

The **table XV** also shows that there is strong correlation that lack of coordination negatively affects humanitarian supply chain performance($r=0.787$, $p=0.000$, $p<0.01$). From this, it can be understood that effective coordination among humanitarian actors improves or maintain better humanitarian supply chain performance and its absence significantly affects humanitarian supply chain performance.

Therefore, the null hypothesis which states that lack of coordination among humanitarian actors has no effect on humanitarian supply chain performance is rejected. This is in line with the argument that effective and efficient operation of logistics performance depends on successful management of internal and external relationships (Christopher, 2005).

However, the study by (Anisya, T. & Kopczak, L., 2005) indicates that there is lack of collaboration among various humanitarian aid organizations. Lack of coordination with supply chain actors (Thomas and Kopczak, 2005; Kovacs and Spens, 2007; Samii, 2010) and external stakeholders (Van der Laan *et al*., 2009) may lead to oversupply in some regions and under-supply in others, while competing for the same resources drives up prices; lack of coordination among humanitarian supply chain actors significantly affects performance of humanitarian logistics (Jateni, 2018).

D. Coefficient of limited access to IT and its negative effect on HSC performance

As it can be seen from **XV,** there is strong correlation that limited access to information system technology negatively affects humanitarian supply chain performance($r=0.709$, $p=0.000$, $p<0.01$). This implies that effective and efficient use of information system

technology leads to effective humanitarian supply chain performance. In other words, limited access to information system technology significantly affects humanitarian supply chain performance.

Therefore, the null hypothesis which states that limited access to information system technology has no effect on humanitarian supply chain performance is rejected. This is in line with the argument that limited access to and use of technology (Beamon, 2004; Van der Laan *et al*., 2009), such as information systems and software tools, make it hard or impossible to retrieve, store, distribute (Lee and Lee, 2007; Van Wassenhove & Pedraza Martinez, 2012; Van der Laan *et al.*, 2009b) and analyze field data. The practical experience in different humanitarian aid organizations indicates that information systems put in place to help meet emergency program requirements are very incomplete, ineffective or inefficient (Maxwell & Watkins, 2003) and thus affect humanitarian supply chain performance. This is also in line with the argument by Yosef (2018) that absence of consistent information communication technology significantly affect humanitarian supply chain efficiency.

E. Coefficient of degraded infrastructure and its negative effect on HSC performance

The table XV portrays that there is very strong correlation that degraded infrastructure negatively affects humanitarian supply chain performance($r=0.802$, $p=0.000$, $p<0.01$). From this, it can be understood that good infrastructure facilitates the undertakings of humanitarian operations but degraded infrastructure significantly affects humanitarian supply chain performance of AAH and MSF-Spain.

Therefore, the null hypothesis which states that degraded infrastructure has no effect on humanitarian supply chain performance is rejected. This is in line with the argument by Kunz and Reiner (2012) that infrastructural factors, like local transportation capacity and road/main port accessibility affect humanitarian supply chain performance.

F. Coefficient of environmental factor and its negative effect on HSC performance

As it can be seen from the **table XV**, there is strong correlation that environmental factors negatively affect humanitarian supply chain performance($r=0.635$, $p=0.000$, $p<0.01$). From this, it can be understood that environmental factors significantly affect humanitarian supply chain performance of AAH and MSF-Spain.

Therefore, the null hypothesis which states environmental factors have no effect on humanitarian supply chain performance is rejected. This corresponds to Kunz and Reiner (2012) who proposed environmental factors (influencing the demand for certain medicines) influence humanitarian supply chain performance.

G. Coefficient of socio-economic factor and its negative effect on HSC performance

As it can be seen from the **table XV**, there is strong correlation between socio-economic factors negatively affects humanitarian supply chain performance($r=0.776$, $p=0.000$, $p<0.01$). From this, it can be understood that socio-economic factors significantly affect humanitarian supply chain performance of AAH and MSF-Spain.

Therefore, the null hypothesis which states socio-economic factors have no effect on humanitarian supply chain performance is rejected. This is in line with an argument of Kunz and Reiner (2012) that socio-economic factors (influencing the supply of goods and skilled labor) affect humanitarian supply chain performance. Ii also corresponds with

Yosef (2018) who argued that socio-economic factors affect humanitarian supply chain efficiency.

H. Coefficient of governmental factor and its negative effect on HSC performance

T**able XV** shows that there is moderately strong correlation that governmental factors negatively affect humanitarian supply chain performance($r=0.554$, $p=0.000$, $p<0.01$). From this, it can be understood that governmental factors significantly affect humanitarian supply chain performance of AAH and MSF-Spain.

Therefore, the null hypothesis which states governmental factors have no effect on humanitarian supply chain performance is rejected. This is in line with argument of Kunz and Reiner (2012) that governmental factors (the political climate is often volatile, trucks might be stopped or blocked by rebel forces in times of war, looting of the supply might occur, or vehicles are even completely deviated from the intended location) and hence affect humanitarian supply chain performance.

I. Coefficient of donor restriction and its negative effect on HSC performance

The **table XV** show that there is moderately strong correlation that donor restrictions negatively affect humanitarian supply chain performance($r=0.546$, $p=0.000$, $p<0.01$). From this, it can be understood that donor restrictions affects humanitarian supply chain performance of AAH and MSF-Spain.

Therefore, the null hypothesis which states donor restrictions have no effect on humanitarian supply chain performance is rejected. This corresponds with the argument that donors often request their funds be spent on direct materials and food, and even at a particular disaster location, rather than on crucial but indirect services such as information

systems, staff training, and/or disaster preparedness (Kovacs and Spen, 2007) and hence affect humanitarian supply chain performance. This is also in line with the arguments of Yosef (2018) and Jateni (2018) who concluded that donor factors affect humanitarian supply chain efficiency.

J. Coefficient of uncertainty and negative effect on HSC performance

The **table XV** show that there is moderately strong correlation that uncertainty negatively affects humanitarian supply chain performance($r=0.467$, $p=0.000$, $p<0.01$). From this, it can be understood that uncertainty on the occurrence of disaster significantly affects humanitarian supply chain performance of AAH and MSF-Spain.

Therefore, the null hypothesis which states donor restrictions have no effect on humanitarian supply chain performance is rejected. This is in line with the argument that humanitarian workers always face the unknown: when, where, what, how much, where from and how many times; in short, the basic parameters needed for an efficient supply chain setup are highly uncertain (Van Wassenhove, 2006). It also corresponds with the finding of Antai, Mutshinda and Owusu, 2015) who argued that inherent uncertainty significantly affect humanitarian supply chai operations.

K. Coefficient of time pressure and its negative effect on HSC performance

The **table XV** show that there is moderately strong correlation that time pressure affects humanitarian supply chain performance($r=0.553$, $p=0.000$, $p<0.01$). From this, it can be understood that time pressure moderately affects humanitarian supply chain performance of AAH and MSF-Spain.

Therefore, the null hypothesis which states time pressure has no effect on humanitarian supply chain performance is rejected. This is in line with the argument that the time

pressure, which calls for quick action (Van Wassenhove, 2006) can significantly affect humanitarian supply chain performance.

4.3.5 Multiple Linear Regression Analysis

Regression is the determination of a statistical relationship between two or more variables (Kothari 2004). This regression analysis is conducted to know by how much the independent variable explains the dependent variable.

The researcher tested the hypotheses of the research using regression analyses as this technique was considered most appropriate and more conservative compared to covariance based modeling approaches, due to the complexity of the model and the available data points, and the great robustness of this technique (Dubey et al., 2015).The regression was conducted between factors affecting humanitarian supply chain management (independent variables) and their negative effect on humanitarian supply chain performance (dependent variable).The results of the regression analysis are presented as follows.

4.3.5.1 Multi Collinearity Test

Muliti collinearity test of independent variables was conducted to check whether the assumptions for regression analysis are met or not. According to Mendard, (1995) Tolerance should be more than 0.2 and VIF (Variance Inflation Factor) should be less than 10 (Myers, 1990).

The result in **table-XVI** below shows that the collinearity between independent variables has no serious problem since the value of tolerance for all independent variables is greater than 0.2 and all VIF is less than ten (VIF<10).Therefore, the assumption for regression analysis are met.

Table XVI: Multi Collinearity Test of independent variables

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Human resource turn over	.248	4.029
	Lack of performance metrics	.284	3.525
	Lack of coordination	.225	4.453
	Limited access to information system technology	.204	4.904
	Degraded infrastructure	.211	4.733
	Environmental factors	.368	2.719
	Socio-economic factors	.227	4.409
	Governmental factors	.203	4.924
	Donor restrictions	.221	4.516
	Uncertainty	.390	2.562
	Time pressure	.440	2.272
a. Dependent Variable: Negative effect on humanitarian supply chain performance			

Source: Research Data (2020)

4.3.5.2 Stepwise Multiple Regression Analysis: ANOVA

Table XVII: Stepwise Multiple Regression Analysis: ANOVA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	16.762	11	1.524	212.812	.000[b]
	Residual	.251	35	.007		
	Total	17.012	46			

a. Dependent Variable: Negative Effect on Humanitarian Supply Chain Performance

b. Predictors: (Constant), Time pressure, Governmental Factors, Environmental Factors, Lack of coordination, Uncertainty, Lack of performance metrics, Human Resource Turnover, Socio-economic factors, Degraded infrastructure, Donor restrictions, Lack of information system technology

(Source: Research Data, 2020)

As it can be seen from table **XVII** above**,** the significant value (p-value) is 0.000, which is less than 0.05. If the F ratio is large and probability is less than 0.05 then it is termed as statistically significant (Saunders, 2012). Thus, the F-statistic of each independent variables is 212.812, which is large and thus the model is overall good fit and significant at $p< 0.05$.

Furthermore, **Table XVIII** below shows the model summary of the regression analysis and it reveals that there is a significant overall contribution of the three factors (eleven variables) on humanitarian supply chain performance.

Table XVIII: Stepwise Multiple Regression Analysis: Results of Model Summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.993[a]	.985	.981	.08462

a. Predictors: (Constant), Time pressure, governmental factors, Environmental factors, Lack of coordination, Uncertainty, Lack of performance metrics, Human resource turnover, Socio-economic factor, Degraded infrastructure, Donor restriction, Limited access to information system technology

(Source: Research Data, 2020)

As it can be seen from the table above, the R^2 value is 0.985. This indicates that 98.5% of the independent variables (factors affecting humanitarian supply chain management system) contributed to overall humanitarian supply chain performance in AAH and MSF-Spain. In other words, 98.5% of the total variance of the humanitarian supply chain in both organizations is explained by the three factors (eleven variables) affecting humanitarian supply chain performance.

4.3.5.3 Stepwise Multiple Regression Analysis: Results of Coefficient

Table below shows that Beta coefficient for human resource turnover is 0.744 (β=0.744); lack of performance metrics is 0.146 (β= 0.146); lack of coordination is 0.380 (β=0.380);

limited access to information system technology is 0.173 (β= 0.173); degraded infrastructure is 0.428(β=-0.428); environmental factors is 0.073 (β=0.073); socio-economic factors is 0.089 (β = 0.089); donor restrictions is 0.374 (β=0.374); uncertainty is 0.081(β=0.081); time pressure is 0.138(β=0.138).

Table XIX: Stepwise Multiple Regression Analysis: Results of Coefficient

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.464	.103		4.509	.000
	Human resource turnover	.795	.044	.744	18.055	.000
	Lack of performance metrics	.116	.031	.146	3.781	.001
	Lack of coordination	.251	.029	.380	8.774	.000
	Limited access to information system technology	.183	.048	.173	3.801	.001
	Degraded infrastructure	.358	.037	.428	9.583	.000
	Environmental factors	.049	.023	.073	2.159	.038
	Socio-economic factors	.048	.024	.089	2.058	.047
	Governmental factors	.074	.042	.079	1.743	.090
	Donor restriction	.261	.034	.331	7.584	.000
	Uncertainty	.063	.026	.081	2.467	.019
	Time pressure	.077	.017	.138	4.469	.000

(Source: Research Data, 2020)

As it can be seen from the table, all the independent variables have linear relationship with dependent variable (negative effect on humanitarian supply chain performance). The standardized coefficient Beta value shows the sequence of contribution of individual independent variables on humanitarian supply chain performance.

This demonstrates that human resource turnover (β=0.744) is critical factor affecting humanitarian supply chain performance in AAH and MSF-Spain followed by degraded infrastructure (β=0.428) and lack of coordination among humanitarian actors (β=0.380).

4.3.5.4. Summary of regression result of factors affecting HSC Performance of AAH and MSF-Spain

As it can be seen from **table XIX**, the p-value for human resource turnover =0.000; lack of performance metrics=0.01; lack of coordination=0.000; limited access to information technology=0.001; degraded infrastructure=0.000; environmental factors=0.038; socio-economic factors=0.047; donor restrictions=0.000; uncertainty=0.019 and time pressure=0.000 which are all less than 0.05. Thus, we can conclude that humanitarian supply chain performances of AAH and MSF-Spain are significantly affected by human resource turnover, lack of performance metrics, and lack of coordination, limited access to information technology; degraded infrastructure, environmental factors; socio-economic factors; donor restrictions, uncertainty and time pressure.

However, the p-value for governmental factor=0.09 which are greater than 0.05. Thus, we can conclude that humanitarian supply chain performances of AAH and MSF-Spain are not significantly affected by governmental factors.

As it can be seen from the analysis result, the p-value of all of the endogenous factors and non-situational exogenous factors are less than 0.05. Thus, it can be concluded that, humanitarian supply chain performances of AAH and MSF-Spain is more affected by endogenous factors and non-situational exogenous factors. Situational exogenous factors also significantly affect humanitarian supply chain performance of both organizations except governmental factors.

4.3.6 Hypothesis Summary

Table XX: Summary of Hypothesis Testing Results

Hypothesis	Method	Result	Reason
H_1:Human resource turnover negatively and significantly affects the humanitarian supply	Pearson's Correlation	Accepted	P<0.05
H_2:Limited access to information technology negatively and significantly affects the	Pearson's Correlation	Accepted	P<0.05
H_3: Lack of coordination among humanitarian actors negatively and significantly affects the	Pearson's Correlation	Accepted	P<0.05
H_4: Lack of performance metrics negatively and significantly affects the humanitarian supply	Pearson's Correlation	Accepted	P<0.05
H_5: Infrastructural factor negatively and significantly affects the humanitarian supply	Pearson's Correlation	Accepted	P<0.05
H_6: Environmental factor negatively and significantly affects the humanitarian supply	Pearson's Correlation	Accepted	P<0.05
H_7: Socio-economic factor negatively and significantly affects the humanitarian supply	Pearson's Correlation	Accepted	P<0.05
H_8: Governmental factor negatively and significantly affects the humanitarian supply	Pearson's Correlation	Accepted	P<0.05
H_9: Donor restriction negatively and significantly affects the humanitarian supply	Pearson's Correlation	Accepted	P<0.05
H_{10}: Uncertainty negatively and significantly affects the humanitarian supply chain	Pearson's Correlation	Accepted	P<0.05
H_{11}: Time pressure negatively and significantly affects the humanitarian supply chain	Pearson's Correlation	Accepted	P<0.05

Source: Research Data (2020)

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

This final chapter of the research deals with the summary of the major findings of the study. Drawn from these major findings, conclusions are presented; and recommendations which the researcher assumes to be operational are also forwarded.

5.1. Summary of the findings

In this study, descriptive statistics was used to analyze the demographic characteristics of the respondents; responses of the respondents on humanitarian supply chain practices and HSC performance-using mean and standard deviation.

Factor analysis was conducted using the Kaiser-Meyer-Olkin(KMO) measure of sampling adequacy and the result has revealed all the KMO values where above 0.5 and were acceptable.

Independent sample t-test was conducted using Independent Samples Mann-Whitney U Test to identify if there is mean difference between the two groups (Action-Against-Hunger and MSF-Spain) and the result has revealed that there is no mean difference between the two groups.

Moreover, Pearson's Correlation was used to determine the correlation between eleven (11) variables (human resource turnover, lack of performance metrics, lack of coordination, limited access to information system technology, degraded infrastructure, environmental factors, socio-economic factors, governmental factors, donor restrictions, and uncertainty and time pressure) and their effect on humanitarian supply chain performance. Also, multiple regression analysis was used to find out the relative importance/weight of the

variables in affecting the humanitarian supply chain performance of AAH and MSF-Spain. Summary of the major findings of descriptive and inferential analysis is presented below.

1. Descriptive Analysis Result

A. Humanitarian Supply Chain Management Practices

- Based on the cumulative result of descriptive statistics, procurement practice scored a grand mean of 4.09 and a standard deviation of 0.70. This shows that both AAH and MSF-Spain have procurement practices to support their supply chain operations.
- Moreover, the grand mean and standard deviation for inventory management practice were 3.83 and 0.91, respectively. This infers that both AAH and MSF-Spain have inventory management practices to support their supply chain operations.
- As per the cumulative result of descriptive statistics, warehouse management practice has scored a grand mean of 3.87 and a standard deviation of 0.89, and this result indicates that both AAH and MSF-Spain have warehouse management practices to support their supply chain operations.
- Finally, according to the cumulative result of descriptive statistics, transportation management has scored a mean of 4.05 and a standard deviation of 0.70. This result shows that both AAH and MSF-Spain have transportation management practices to support their supply chain operations.

B. Humanitarian Supply chain performance

Humanitarian supply chain performance has been measured from the points of view of the four humanitarian supply chain management practices(procurement, inventory

management, warehouse management and transportation management) using the SCOR metrics level two attributes(flexibility, cost, reliability and responsiveness) as stated in Fritz Institute(2012).

- According to the cumulative result of descriptive statistics for each SCOR attribute, the procurement performance of the organizations has been reported as reliable (mean=3.44) and cost efficient (mean=3.55) but not flexible (mean=3.28) and responsive (mean=2.91). However, according to overall cumulative result, procurement performance scored grand mean of 3.30 and standard deviation of 0.81. This result shows that the procurement performance of both organizations is weak as the level of agreement by the respondents was low.
- As per the cumulative result of descriptive statistics for each SCOR attribute, it has been noted that inventory management performance of the organizations is flexible (mean=3.77), reliable (mean=3.64), responsive (mean=3.81) and cost efficient (mean=3.74). Moreover, according to the overall cumulative result, inventory management performance scored 3.74 and standard deviation of 0.80. This result indicates that the inventory management performance of both organizations is good.
- According to the cumulative result of descriptive statistics for each SCOR attribute, warehouse management system of the organizations is flexible (mean=3.62), cost-efficient (3.81), reliable (3.94) and responsive (3.58). Moreover, as per the overall cumulative result, warehouse management performance scored 3.74 and standard deviation of 0.74. This result indicates that the warehouse management performance of both organizations is good.

- As per the cumulative result of descriptive statistics for each SCOR attribute, transportation management system of the organizations is flexible (mean=3.89), cost-efficient (3.86), reliable (3.94) and responsive (3.67). Moreover, according to the overall cumulative result, transportation management performance scored 3.84 and standard deviation of 0.67. This result indicates that the transportation management performance of both organizations is good.
- Finally, the mean values of each performance dimensions (flexibility, cost, reliability and responsiveness) were calculated for each supply chain practice (procurement, inventory management, and warehouse and transport management).The result show that the cumulative mean for each SCOR metrics to measure supply chain performance of AAH and MSF is flexible (mean=3.64); cost efficient (mean=3.74); reliable (mean=3.74) and responsive (mean=3.49). The grand mean value=3.65 is also above the cut-off point of 3.39 on the 5-point Likert Scale. Thus, it is concluded that the overall humanitarian supply chain performance of AAH and MSF-Spain is good.

2. Inferential analysis result of factors affecting humanitarian supply chain of AAH and MSF-Spain

- The factor analysis result show that the final solution for the 16-item endogenous factor scale consisted of 4 variables that explained 68.70 % of the variance. The value of KMO was .687 and Bartlett's test of sphericity was significant ($\chi 2 = 53.93$, $df = 6$, $p < .005$) indicating factor analysis was appropriate for the data.
- The final solution for the 20-item situational exogenous factor scale consisted of 5 variables that explained 62.60 % of the variance. The value of KMO was .626 and

Bartlett's test of sphericity was significant ($\chi 2$ = 110.712, df = 10, p < .005) indicating factor analysis was appropriate for the data.

- The final solution for the 8-item non-situational exogenous factor scale consisted of 2 variables that explained 58.1 % of the variance. The value of KMO was .581 and Bartlett's test of sphericity was significant ($\chi 2$ = 4.159, df = 1, p < .005) indicating factor analysis was appropriate for the data.
- The study has shown that there is a significant correlation between the eleven variables and dependent variable (negative effect on humanitarian supply chain performance). Effect of human resource turnover, lack of coordination, limited access to information technology, degraded infrastructure and socio-economic factors had strong relationship that they negatively affect humanitarian supply chain performance with r- values of 0.904, 0.787, 0.709, 0.802 and 0.776, respectively. Lack of performance metrics, environmental factors, governmental factors, donor restriction, uncertainty and time pressure had moderately strong relationship with dependent variable (negative effect on humanitarian supply chain performance) with r–values of 0.506, 0.635, 0.554, 0.546, 0.467 and 0.553, respectively with P-value=0.000.
- With reference to regression result, in this study, human resource turnover (β=0.734) is considered as critical factor followed by degraded infrastructure (β=0.428) and lack of coordination among humanitarian actors (β=0.380).
- The overall regression results show that 98.5% of the total variance of the humanitarian supply chain in both organizations is explained by the three factors (eleven variables) affecting humanitarian supply chain performance.

5.2 Conclusion

The most vital aim within humanitarian relief operations is in the end to save lives and thus it is essential for humanitarian organizations with high responsiveness as it is concerned with timesaving (Cozzolino, et. al., 2012). Moreover, one of the most essential aims of humanitarian supply chains is high efficiency and not wasting the scarce resources, since this affects the aim of humanitarian organizations, which is to save as many lives as possible (Oloruntoba & Gray, 2006).

Humanitarian organizations are highly dependent on their logistics and supply chain management that represents approximately 80 percent of total relief budgets (Kent, 2004, Van Wassenhove, 2006). Thus, sound, knowledgeable management of logistics and supply chain operations is vital to the successful achievement of humanitarian organization objectives. Humanitarian organizations must develop appropriate humanitarian supply chain system that is flexible, reliable, cost efficient and responsive to satisfy the needs of beneficiaries.

The descriptive analysis result of this research study shows that the four humanitarian supply chain functions (procurement, inventory management, warehouse and transportation management) are practiced in AAH and MSF-Spain. The overall humanitarian supply chain performance of AAH and MSF-Spain is good.

The regression analysis shows that human resource turnover (β=0.744) is critical variable that is significantly affecting humanitarian supply chain performance of AAH and MSF-Spain followed by degraded infrastructure (β=0.438) and lack of coordination (β=0.380). According to this research finding, other variables like lack of performance metrics (β= 0.146), limited access to information system technology (β= 0.173), socio-economic

factors (β= 0.089), environmental factors (β=0.073), donor restrictions (β= 0.331); uncertainty (β=0.081) and time pressure (β=0.138) also hinder the proper implementation of humanitarian operations.

Overall, it can be understood from the analysis result that endogenous factors are critical and more affect humanitarian supply chain management of both organizations.

5.3 Recommendations

- With reference to individual humanitarian supply chain functions, the findings in chapter four shows that the organizations are weak in procurement performances (mean=3.30). However, the grand mean of overall Humanitarian supply chain performance (mean=3.65) is above cut-off point of 3.39 which shows that both AAH and MSF-Spain have good overall supply chain performances. Thus, both organizations are advised to keep-up with the current humanitarian supply chain performance but should improve the procurement performance.
- The findings in chapter four show that endogenous factors significantly affect humanitarian supply chain performances of AAH and MSF-Spain in general and human resource turnover(β=0.744); degraded infrastructure(β=0.438) and lack of coordination in particular(β=0.380). Therefore, both AAH and MSF-Span and other humanitarian organizations are advised to emphasize more on endogenous factors in general and also the three variables(human resource turn over, infrastructural factors and lack of coordination among humanitarian supply chain actors in particular to create efficient and responsive humanitarian supply chain.

5.4 Further Research Directions

This study was to examine the three factors affecting humanitarian supply chain performance: endogenous factors (four variables), situational exogenous factors (five variables) and non-situational exogenous factors (two variables). According to the multiple regression result, all the variables had p-value less than 0.05 and hence considered as influencing variables affecting humanitarian supply chain performance except governmental factors. Thus, this study provides suggestion for future researchers to investigate if governmental factors do not really have an effect on humanitarian supply chain performance.

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APPENDIX A: RESEARCH QUESTIONNAIRE

Dear Sir/Madam,

Thank you in advance for becoming my respondent in this research.

I am **MA student** of the **Addis Ababa University, School Of Commerce**, and I kindly request your assistance to provide me with the necessary responses towards my research on "T**he Factors Affecting Humanitarian Supply Chain Performance: " The Cases of Action-Against-Hunger and Medecins-Sans-Frontieres(MSF-SPAIN)."** The questionnaire consists of four sections: Demographic characteristics, statements related to humanitarian supply chain practices, statements related to humanitarian supply chain performance and three factors (Endogenous factors, situational exogenous factors and non-situational exogenous factors) that influence humanitarian supply chain performance.

I will like to assure you that this study is purely for academic purposes and all the answers you provide here will be treated with the highest level of confidentiality. I; therefore, covet your objectivity and clarity to make this study successfully conducted for its intended purpose.

With kind regards,

Gemechis Mekonnen Tolessa

Tel: (+251)0941-42-03-53

E-mail: gamemoka@gmail.com

Section I: Demographic Characteristics

This section is aimed to obtain information related to your background. (Please tick (√) to provide your answer.

1. Gender ( )Male ( )Female
2. Age ( ) Below 21 years ( ) 21-30 years
   ( ) 31-40 years ( ) 41-50 years
   ( ) Above 50 years
3. Educational level ( ) Below Diploma ( ) Diploma
   ( ) BA/BSC ( ) MA/MSC
   ( ) MA/MSC ( ) Other (Please specify)_____
4. Year of experience ( )Less than 1 year ( )1-3 Years
   ( ) 3-5 years ( ) Above 5 years
5. Department/Work unit ( ) Logistics and supply ( ) Program
   ( ) IT ( ) Finance
   ( ) Other (Please specify)_____
6. Employer Organization ( ) Action-Against-Hunger
   ( ) Medecins Sans Frontiers (MSF-SPAIN)

Section II: Procurement, inventory management, transportation and distribution management and warehouse/location) practices of Action-Against-Hunger and Medicines-Sans-Frontieres(MSF-SPAIN).

This section contains 34 statements related humanitarian supply chain practices of Action-Against-Hunger and Medicines-Sans-Frontiers (MSF-SPAIN). (Please tick (√) the box which you think is appropriate. The five points Likert Scale (1-5) shows different states of agreement in which: **1: Strongly Disagree; 2: Disagree; 3: Neutral; 4: Agree; 5: Strongly Agree.**

S/N	Statements	Rating				
	(1) Procurement Practice	**1**	**2**	**3**	**4**	**5**
1	The organization has the practices of conducting initial need assessment shortly after the disaster strikes					
2	The organization has the practices of quantifying the relief supplies required to meet needs of the affected population.					
3	The organization has the practices of reviewing the need for relief supplies to identify the stock of prepositioned supplies in the warehouse before determining the quantity of relief items to be procured from suppliers					
4	The organization has the practices of preparing purchase request for the items that need to be procured from suppliers					
5	The organization has the practices of preparing Request for Quotation to get price quotes from suppliers as per the required specification					
6	The organization has the practice of conducting comparative bid analysis to identify the successful supplier based on the predefined selection criteria					
7	The organization has the practices of placing purchase order to procure the relief supplies from successful suppliers					
8	The organization has the practices of negotiation and contract management with suppliers					
9	The organization effects payment for suppliers after goods are delivered to the warehouse as per the predefined specification and agreed up on terms and conditions					
10	The organization uses automated system to manage the procurement activities					
11	The organization measures supplier performance regularly					
12	The organization maintains long term agreements with potential suppliers in order to improve supply capacity need during disaster occurrence					

	(2) Inventory Management Practice	1	2	3	4	5
1	The organization maintains safety stock of inventory of relief items to quickly respond to disasters when they occur					
2	The organization has a practice of using Reception Note to receive relief items to the warehouse					
3	The organization has the practice of using Delivery Notes to issue relief items to their destination					
4	The organization uses stock cards to know stock balance of relief items in the warehouse					
5	The organization implements First-In-First-Out inventory management technique to issue items from warehouse					
6	The organization implements Last-In-First-Out inventory management technique to issue items from warehouse					
7	The organization conducts regular stock count of inventory to determine the balance of relief items on hand					
8	The organization has a procedure for timely disposal of obsolete and expired relief items					
9	The organization tracks the stock inventory in the warehouse using the automated system					
	(3) Transportation Management Practice	**1**	**2**	**3**	**4**	**5**
1	The organization has the practices of determining transport modes to deliver the relief supplies to affected area					
2	The organization has the practices of deciding load capacity to fully utilize the transport facility to move relief supplies to their destination					
3	The organization has the practices of scheduling the transportation of relief supplies to beneficiaries					
4	The organization has the practices of routing the transportation of relief supplies to their destination					
5	The organization has the practices of tracking the movement of transport facilities while travelling to their destination					
6	The organization has the practices of accompanying the freight with the waybill to ensure the legality of the consignment					
	(4)Warehousing Management Practice	**1**	**2**	**3**	**4**	**5**
1	The organization locates warehouse facility at strategic places to quickly respond to disasters when they occur					
2	The organization has the practices of deciding the size of the warehouse facilities based on demand					
3	The organization has the practices of deciding the number of warehouse facilities based on demand					
4	The organization has the practices of deciding the capacity of the warehouse facilities based on demand					

5	The organization has the practices of receiving relief supplies to warehouse after they are procured					
6	The organization has the practices of put away of procured relief supplies in the warehouse					
7	The organization has the practice of packaging the relief supplies to protect the relief items from damage					
8	The organization has the practices of dispatching relief items to disaster areas					
9	The organization has the practices of optimizing storage space					
10	The organization has the practices of using material handling equipment to load/unload the relief items					
11	The organization has the practices of storing materials in designated places for latter tracing					

Section III: The three variables (Endogenous factors, situational exogenous factors and non-situational exogenous factors) and their effects on Humanitarian supply chain performance of Action-Against-Hunger and Medicines-Sans-Frontieres (MSF-SPAIN).

This section contains 44 statements related to the factors that affect humanitarian supply chain performance of Action-Against-Hunger and Medicines-Sans-Frontiers (MSF-SPAIN). (Please tick (√) the box which you think is appropriate. The five points Likert Scale (1-5) shows different states of agreement in which: **1: Strongly Disagree; 2: Disagree; 3: Neutral; 4: Agree; 5: Strongly Agree.**

S/N	**Statements**	**Rating**				
	Endogenous Factors(Human resource, performance metrics, coordination and information system) affecting HSCM performance	**1**	**2**	**3**	**4**	**5**
HR1	High human resource turnover affects the responsiveness (speed) at which the organization responds to disaster					
HR2	High human resource turnover affects the flexibility of the organization to react to external changes					
HR3	High human resource turnover affects the financial efficiency of the organization					
HR4	High human resource turnover affects the reliability to deliver the relief supplies to beneficiaries as expected					
P1	Lack of performance metrics impede the responsiveness (speed) at which the organization respond to disasters					
P2	Lack of performance metrics impede the flexibility of the organization to react to external changes					

P3	Lack of performance metrics impede financial efficiency of the organization					
P4	Lack of performance metrics impede the reliability to deliver the relief supplies to beneficiaries as expected					
CO1	Lack of coordination among key actors affects the responsiveness(speed)at which the organization responds to disaster					
CO2	Lack of coordination among key actors affects the flexibility of the organization to react to external changes					
CO3	Lack of coordination among key actors affects the financial efficiency of the organization					
CO4	Lack of coordination among key actors affects the reliability to deliver the relief supplies to beneficiaries as expected					
IT1	Limited access to information system technology affects the responsiveness(speed) at which the organization responds to disasters					
IT2	Limited access to information system technology affects the flexibility of the organization to react to external changes					
IT3	Limited access to information system technology affects the financial efficiency of the organization					
IT4	Limited access to information system technology affects the reliability to deliver the relief supplies to beneficiaries as expected					
	Situational Exogenous Factors (Infrastructural factors, environmental factors, socio-economic factors, governmental factors and donor restrictions) affecting HSCM performance	**1**	**2**	**3**	**4**	**5**
DI1	Degraded infrastructure affects the responsiveness (speed) at which the organization to responds to disasters					
DI2	Poor infrastructure affects the flexibility of the organization to respond to external changes					
DI3	Damaged infrastructure affects financial efficiency of the organization					
DI4	Degraded infrastructure affects the reliability to deliver the relief supplies to beneficiaries as expected					
EF1	Environmental factors affects the responsiveness (speed) at which the organization responds to disaster					
EF2	Environmental factors affect the flexibility of the organization to respond to external changes					
EF3	Environmental factors affect financial efficiency of the organization's relief operation					
EF4	Environmental factors affect the reliability to deliver the relief supplies to beneficiaries as expected					

SE1	Socio-economic factors affects the responsiveness (speed) at which the organization responds to disaster					
SE2	Socio-economic factors affect the flexibility of the organization to respond to external changes					
SE3	Socio-economic factors affect the financial efficiency of the organization					
SE4	Socio-economic factors affect the reliability to deliver the relief supplies to beneficiaries as expected					
GF1	Governmental factors affects the responsiveness (speed) at which the organization responds to disaster					
GF2	Governmental factors affect the flexibility of the organization to react to external changes					
GF3	Governmental factors affect the financial efficiency of the organization					
GF4	Governmental factors affect the reliability to deliver the relief supplies to beneficiaries as expected					
DR1	Donor restriction affects the responsiveness(speed) at which the organization responds to disaster					
DR2	Donor restriction affect the flexibility of the organization to react to external changes					
DR3	Donor restriction affect the financial efficiency of the organization					
DR4	Donor restriction affect the reliability to deliver the relief supplies to beneficiaries as expected					
	Non- Situational Exogenous Factors(Uncertainty and time pressure)	**1**	**2**	**3**	**4**	**5**
U1	Uncertainty of the disaster affects the responsiveness (speed) at which the organization responds to disaster					
U2	Uncertainty of the disaster affects the flexibility of the organization to react to external changes					
U3	Uncertainty of the disaster affects the financial efficiency of the organization					
U4	Uncertainty of the disaster affects the reliability to deliver the relief supplies to beneficiaries as expected					
TP1	Time pressure affects the responsiveness(speed) at which the organization responds to disaster					
TP2	Time pressure affects the flexibility of the organization to react to external changes					
TP3	Time pressure affects the financial efficiency of the organization					
TP4	Time pressure affects the reliability to deliver the relief supplies to beneficiaries as expected					

Section IV: Overall effects of endogenous, situational exogenous factors and non-situational exogenous factors on humanitarian supply chain performance.

This section contains 11 statements related to overall effect of the three factors on humanitarian supply chain performance. (Please tick (√) the box which you think is appropriate. The five points Likert Scale (1-5) shows different states of agreement in which: **1: Strongly Disagree; 2: Disagree; 3: Neutral; 4: Agree; 5: Strongly Agree.**

S/N	Statements	Ratings				
	Overall effects of factors affecting humanitarian supply chain performance	**1**	**2**	**3**	**4**	**5**
HR	Human resource turnover affects humanitarian supply chain performance					
COO	Lack of coordination among humanitarian actors affects humanitarian supply chain performance					
PER	Lack of performance metrics affects humanitarian supply chain performance					
IT	Limited access to information system technology affects humanitarian supply chain performance					
INFR	Degraded infrastructure affects humanitarian supply chain performance					
ENV	Environmental factors affect humanitarian supply chain performance					
SOCIO	Socio-economic factors affect humanitarian supply chain performance					
GOV	Governmental factors affect humanitarian supply chain performance					
DONOR	Donor restriction affects humanitarian supply chain performance					
U	Uncertainty of disaster affects humanitarian supply chain performance					
TP	Time pressure affects humanitarian supply chain performance					

Section V: Humanitarian Supply chain performance

This section contains 48 statements related to humanitarian supply chain performance. (Please tick (√) the box which you think is appropriate. The five points Likert Scale (1-5) shows different states of agreement in which: **1: Strongly Disagree; 2: Disagree; 3: Neutral; 4: Agree; 5: Strongly Agree.**

S/N		Rating				
	Procurement Performance	**1**	**2**	**3**	**4**	**5**
FL1	The sourcing/procurement practice of the organization is flexible in terms of time to respond to disasters					
FL2	Procurement/sourcing practice of the organization is flexible in terms of volume to respond to different magnitude of disasters					
FL3	The sourcing/procurement practice of the organization is flexible in terms of mix of different types of relief items it can provide during a particular disaster occurrence					
C1	The procurement/sourcing practice of the organization ensures best value for money					
C2	The procurement/sourcing practice of the organization ensures the delivery of relief items at the lowest total acquisition cost					
C3	The procurement/sourcing practice of the organization ensures the lowest operating costs					
REL1	The procurement practices of the organization ensures on-time delivery of aid supplies to beneficiaries					
REL2	The procurement practice of the organization ensures the right quantity of aid supplies delivered to beneficiaries					
REL3	The procurement practice of the organization ensures the right quality of aid supplies to beneficiaries					
RES1	The procurement practice of the organization ensures the shortest donation-to-delivery time to deliver aid supplies to beneficiaries					
RES2	The procurement practice of the organization ensures the shortest order-to-delivery cycle time to deliver aid supplies to beneficiaries					
RES3	The procurement practice of the organization ensures the shortest order fulfillment cycle time to deliver aid supplies to beneficiaries					
	(2) Inventory Management Performance	**1**	**2**	**3**	**4**	**5**
FL1	The inventory management of the organization is flexible in terms of time to respond to disasters					
FL2	Inventory management of the organization is flexible in terms of volume of relief supplies to respond to different magnitude of disasters					

FL3	The inventory management of the organization is flexible in terms of mix of different types of relief items it can provide during a particular disaster occurrence					
C1	The inventory management of the organization ensures effective asset utilization					
C2	The inventory management of the organization ensures the lowest inventory carrying costs					
C3	The inventory management of the organization ensures that the cost of obsolescence of relief items is minimized					
REL1	Inventory management of the organization ensures delivery of damage free relief items					
REL2	Inventory management of the organization ensures that the right quantity of the relief items are delivered to the affected area					
REL3	Inventory management of the organization ensures that the right quality of the relief items are delivered to the affected area					
RES1	Inventory management of the organization ensures the shortest donation-to-delivery time to deliver relief supplies					
RES2	Inventory management of the organization ensures the pre-positioning of relief supplies to quickly respond to disasters					
RES3	The inventory management of the organization ensures the shortest order fulfillment cycle time					
	(3) Transportation Management Performance	**1**	**2**	**3**	**4**	**5**
FL1	The transportation management of the organization is flexible in terms of the time to respond to disaster occurrence					
FL2	The transportation management of the organization is flexible in terms of volume of relief items to transport to disaster areas					
FL3	The transportation management of the organization is flexible in terms of mix of different relief items to transport to disaster areas					
REL1	The transportation management of the organization ensures on-time delivery of aid supplies to beneficiaries					
REL2	The transportation management of the organization ensures the delivery of the right quantity of aid supplies listed on the packing list to beneficiaries free of discrepancy					
REL3	The transportation management of the organization ensures damage free delivery aid supplies to beneficiaries					
C1	The transportation management of the organization ensures delivery of aid supplies to beneficiaries at the lowest total transportation and distribution costs					
C2	The transport management of the organization ensures the lowest repair and maintenance costs					
C3	The transportation management of the organization ensures the lowest demurrage costs					
RES1	The transportations management of the organization ensures the shortest donation-to-delivery time to deliver relief supplies					

RES2	The transportations facilities of the organization are adequate to quickly respond to disasters					
RES3	The transportation management of the organization ensures the shortest order fulfillment cycle time					
	(4)Warehousing Management Performance	**1**	**2**	**3**	**4**	**5**
FL1	The warehouse/facility location of the organization ensures flexibility in terms of time to respond to disasters					
FL2	The warehouse/facility location of the organization ensures flexibility in terms of capacity to respond to disasters					
FL3	The warehouse/facility location of the organization ensures flexibility in terms of size to respond to disasters					
C1	The warehouse management of the organization ensures the lowest total material handling costs					
C2	The warehouse management of the organization ensures the lowest warehouse costs					
C3	The warehouse management of the organization ensures the lowest asset utilization costs					
REL1	The warehouse management practice of the organization ensures on-time delivery of aid supplies to beneficiaries					
REL2	The warehouse management practice of the organization ensures the right quantity of aid supplies delivered to beneficiaries					
REL3	The warehouse management practice of the organization ensures the damage free delivery of aid supplies to beneficiaries ensured through appropriate packaging					
RES1	The warehouse management practice of the organization ensures the shortest donation-to-delivery time to deliver aid supplies to beneficiaries					
RES2	The warehouse management practice of the organization ensures the shortest order-to-delivery cycle time to deliver aid supplies to beneficiaries					
RES3	The warehouse management practice of the organization ensures the shortest order fulfillment cycle time					

1. To what extent endogenous factors affect the humanitarian supply chain performance of AAH /MSF-SPAIN?

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2. To what extent exogenous situational factors affect the humanitarian supply chain performance of AAH and MSF-SPAIN?

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3. To what extent exogenous non- situational factors affect the humanitarian supply chain performance of AAH and MSF-SPAIN?

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   _____

4. What is the most critical factor affecting the humanitarian supply chain performances of AAH and MSF-SPAIN?

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**********THANK YOU FOR YOUR COOPERATION**********