



THE EFFECT OF LOGISTICS PRACTICES ON DISASTER RESPONSIVENESS THE CASE OF SOUTH WOLLO ZONE INTERNATIONAL MEDICAL CORPS

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DISASTER RESPONSIVENESS THE CASE OF SOUTH
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the Requirements for the Award of Master of Art Degree in Logistic
and Supply Management**

**June, 2023
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DECLARATION

I, the undersigned, declare that this study entitled the effect of logistics practices on disaster responsiveness the case of south wollo Zone International Medical Corps is my own work. I have undertaken the research work independently with the guidance and support of my advisors. This study has not been submitted for any degree or diploma program in this or any other institutions and that all sources of materials used for the thesis have been duly acknowledged.

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THESIS APPROVAL SHEET

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Abstract

The objective of this study was to assess the effect of logistics practices on disaster responsiveness in south wollo, Zone International Medical Corps. In International Medical Corps, there are 1200 employees these employees of the organization are the study populations. The Sample size was fixed to International Medical Corps South Wollo Branch 300 employees were as respondents selected by using purposive sampling technique. The data-gathering tool was questionnaire and interview and it was analyzed using descriptive and inferential statics. The findings of the study indicated that the respondents thought that the status of transportation in the organization was poor for responsive disaster relief activities and it is on affecting the organization responsive disaster activities. Besides, the regression result depicts that $B = 0.443$ $P = 0.000$ ($p < 0.001$). As a result, we can accept the hypothesis and reject the null hypothesis, the warehousing condition of International Medical Corp is found in a poor status and on affecting the organization responsive disaster activities. Furthermore, the regression result shows that $B = 0.502$ $P = 0.000$ ($p < 0.001$). Therefore, the hypothesis is accepted and the null hypothesis rejected and the procurement practice of the organization was poor as a result it is on affecting the organization responsive disaster activity. In addition, the regression result portrays that $B = 0.269$ $P = 0.000$ ($p < 0.001$). As a result, we can accept the hypothesis and reject the null hypothesis. Finally, it is recommended that the organizations expected to improve transportation of the organization in order to avoid any hindrance and needs in disaster responsiveness activities, the warehouse infrastructure is a key structure that should be improved dramatically, there should be of proper protections, warehouse management, stock handling and other related activities expected to be improved and it is recommends that top management of the organization needs to regularly review their procurement policy, procedures and guidelines to cope with fluctuating global trends.

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Key words: *Transportation, Warehousing, Procurement, Disaster Responsiveness*

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Humanitarian logistics“ is defined As „... the process of planning, implementing and controlling the efficient, cost effective flow and storage of goods and materials, as well as related information, from the point of origin to the point of consumption for the purpose of alleviating the suffering of vulnerable people(Thomas and Kopczak, 2005). The function encompasses a range of activities, including preparedness, planning, procurement, transport, warehousing, tracking and tracing, and customs clearance (Thomas and Kopczak, 2005).

The increase in natural and man-made disasters in the recent years has highlighted challenging problems in humanitarian operations, in addition to major long-term humanitarian development (Chakravarty, 2014). Humanitarian logistics plays an important role in preparing for, responding to, and recovering from sudden-onset disasters and addressing long-term development issues. The management of humanitarian logistics operations involves many challenges such as conflicting objectives from multiple stakeholders, coordination and collaboration, high uncertainty, and scarcity of resources (Van Wassenhove, 2006).

Disasters create immense destruction, and even if it has been on the decline in recent years, it is still an issue with high realism. Humanitarian groups, in particular, spend a lot of time and energy supplying nations and people with relief supplies to aid in the recovery process after catastrophes in order to lessen their harmful effects. The complexity and uncertainty of a disaster make it challenging to respond to it effectively. Logistics must be adaptable but effective, placing heavy demands on the purchase process. 65% of all expenses for disaster relief logistics are related to procurement. Despite its importance, disaster relief procurement issues have not received much attention in the literature, which highlights the need for more research on the subject from both a theoretical and practical standpoint (Chakravarty, 2014).

The challenge in disaster relief is to deliver enough emergency supplies precisely when and where they are required. The complexity of humanitarian operations is heightened by the particular obstacles posed to rescuers by uncertainty surrounding the cause, timing, and scope of disasters (Chakravarty, 2014). Logistics is a vital element of every disaster relief operation, as it greatly influences the effectiveness of assistance and dictates the pace, the coverage, and hence the expenditures of humanitarian organizations

(Kov'acs and Spens, 2007; Baumgarten, 2011). High expenses can result from spending money on logistics, particularly during the immediate aftermath of a disaster (Hein et al., 2020). Therefore, there is pressure on humanitarian groups to make logistics operations open and effective (Van Wassenhove, 2006). Because of this, 'humanitarian logistics' is the subject of an expanding body of study that focuses on overcoming the difficulties associated with disaster management (Kov'acs and Spens, 2007).

Even though Ethiopia as a country and Amhara region South Wollo zone as the regional state encounter many disaster related events from year to year for a long period of time which is operationally challenged by poor logistic activity but, it gets less attention. For this reason, there are only few papers that have been done which are not directly related with this topic of study and areas under this study.

Moreover, many studies are available on the subject area of commercial logistics activity however, a few research studies conducted on humanitarian logistics activity on disaster responsiveness in Ethiopia in general and in Amhara region in Particular. Thus, availability of few researches on humanitarian logistics and the problem of the responsive of logistics activity (the speed of response, the right time, sufficient quantity and quality) in humanitarian organizations motivated the researcher to deal with the issue. Therefore, this study was designed to investigate the effects of logistics practices (Transpiration, Warehousing and Procurement) on disaster responses in South wollo zone International Medical corps.

1.2 Statement of the Problem

Disasters can be either manmade or natural occurrences, and both have a negative impact on all living things in the natural world. They can result in losses in terms of physical health as well as in the economic, social, and ecological systems. "Disaster is a natural, technological, or manmade event that causes physical, economic, and social losses, interrupts or interrupts normal life and human activities for all or certain segments of the society," according to Jiang and Yuan (2018). Disasters are thus divided into natural disasters and human calamities. Disasters often refer to "a shocking event that seriously disrupts a community or society by causing human, material, economic, or environmental damage that cannot be handled by local agencies through standard procedures" (Jiang and Yuan, 2018).

Logistics always plays a significant role in relief efforts, according to (Leiras et al., 2014). According to logistics expert Chakravarty (2014), "the ability of logisticians to obtain, transport, and collect supplies at the site of a humanitarian relief operation determines the pace with which humanitarian aid is distributed following a disaster."According to Kunz et al. (2017), logistics management carries out the procurement

or distribution operations in any catastrophic accidents or emergencies, manages the supply of medications, food products, clothing, and donated requests, as well as unrequested donations from different parties/agencies. Along with the flow of humanitarian aid, it also entails the observation and management of resources, money, and data. The definition of humanitarian logistics is "planning, implementing, and controlling activities for the reliable, cost-effective flow and storage of goods and materials, as well as related details, from point of origin to point of consumption, in order to reduce the suffering of vulnerable persons" (Kov'acs and Spens, 2007; Baumgarten, 2011). According to Chiappetta Jabbour et al. (2019), the procedures and methods through which people, resources, knowledge, and information are mobilized to aid catastrophe victims constitute humanitarian logistics.

The design of the transportation of first aid supplies, food, equipment, and emergency responders from supply points to a large number of geographically dispersed destination nodes in the disaster region may be the key concern for humanitarian logistics operations, according to Van Wassenhove (2006). In addition, arranging for a quick and safe evacuation; transporting the impacted individuals to medical facilities is another humanitarian logistical operation. It has been said that "logistical cooperation in the management of humanitarian assistance brings together people with expertise, experience, and skills in different fields in the disaster-affected region to help alleviate the suffering of the affected people through their collective efforts" (Chakravarty, 2014).

Humanitarian logistics stands in stark contrast to conventional logistics operations. Humanitarian logistics' primary goal is to provide affected people with food, shelter, water, and medical care. Additionally, it emphasizes search and rescue operations, the preservation and protection of life, and the restoration of self-sufficiency; in fact, even these actions are hampered by logistical issues and disaster management plans.

The level of achievement of the logistics service provider's objectives with relation to providing the logistics service is measured by the effectiveness of the logistics service. According to (Panayides, 2007), the objectives of a logistics activity provider include providing services on time, accurately storing and delivering information, promptly responding to requests, having the ability to solve problems, keeping promises, and helping clients achieve their own goals.

The issue of choosing the International Medical Corps timetable that will utilize the logistics operations in an efficient manner needs to be addressed in this study. As Fekadu (2013) said in his study on Ethiopian logistics activities focuses on the transportation and customer service practices just utilizing broad features of infrastructure, performance, etc., effective logistics activities lead to more efficient operations. He went into great detail about how the Ethiopian logistics activity system is characterized by poor logistics activities, lack of coordination of goods transport, a low level of infrastructure development for logistics, a lack of task teams, and load vehicles that are overloaded, underloaded, and damaged while being handled, transported, and stored. Additionally, Fekadu's research did not pay close attention to all of the primary logistical procedures, such as inventory management, supply chain management, and warehousing.

The activity shows that the research was only applied to the transportation aspect of logistics and that the other primary logistics activities were left out. The logistics operations and difficulties, specifically in Humanitarian Organization in Ethiopia, have not been the subject of any study. Strong logistics activity is needed to make the humanitarian organization functional and beneficial.

In addition to the aforementioned reasons, the researcher was motivated to perform this study by his own experience. In actuality, the researcher has a solid 8 years of experience working for International Medical Corps. The researcher has actually noticed that the recipients frequently criticize the actions of this humanitarian organization, claiming that their aid did not arrive in a timely manner, in a quantity that satisfied their needs, or that it was not the goods they required. These complaints from those in need are partly attributable to the organization's subpar logistics operations.

Moreover, many studies have been done and a wealth of knowledge exists for commercial logistics however, few studies have been done on humanitarian logistics, but even these are concentrated in Asian countries which are often hit by natural disasters (Verter, 2017). Despite the fact that logistics activity has extensively significant source of research in developed nations, there is still a scarcity of research investigations in Ethiopian context, in particular south wollo zone, Amhara region. Thus the researcher was motivated to fill this gap by conducting this study which focused on the effect of logistic practices on disaster responsiveness in south wollo zone international medical corps.

1.3 Objective of the Study

1.3.1 General Objectives

The general objective of the study was to assess the effect of logistics practices on disaster responsiveness in south wollo, Zone International Medical Corps.

1.3.2 Specific Objectives

In light of the above general objective of the study the following specific objectives were formulated:

1. To explore the effects of transportation on disaster responsiveness in south wollo Zone International Medical Corps.
2. To assess the effects of warehousing on disaster responsiveness in south wollo Zone International Medical Corps.
3. To investigate the effects of procurement on disaster responsiveness in south wollo Zone International Medical Corps.

1.4. Significance of the Study

The results of this study might serve as input for humanitarian organization to assist indecision making, in identifying key variables in order to develop strategies to address and improve logistics activity on disaster responsiveness. By understanding logistics activity on disaster responsiveness, the management of humanitarian organizations can derive ways to improve logistics activity. From the findings, future researchers will be able to fill literature gaps in specific reference the effect of logistics activity on disaster responsiveness.

Based on the analysis the researcher recommended a set of alternative courses of actions to consider enhancing the level of logistics activity. Second, this study contributed to indicate new direction in formulation and implementation of logistics activity on disaster responsiveness. Third, the implications for further research were set and such implications can serve as a stepping-stone for similar research works. Last but not least, this study was mandatorily important to fulfill the academic requirements to take diploma in MA graduate program.

1.5 Scope of the Study

In order to make the study manageable, it is delimited conceptually, geographically as well as methodologically. Conceptually, this study was only focus on the effect of logistics activity on disaster responsiveness. So it only focuses on examining the relationship that exists between logistics activity (Transport, Warehousing, and procurment) and Disaster Responsiveness (Speed of Response, Right

Goods, Right time, Right Quality and Right Quantity) in International Medical Corps in South Wollo Zone. Geographically this study focuses only on South wollo Zone International Medical Corps. Methodologically the study covers the employees of South wollo zone International Medical corps.

1.6 Limitation of the Study

It would have been better for the researcher to use observation and document analysis so as to triangulate the data which were obtained from questionnaires. Besides the researcher thought that the respondents might not give accurate information as they were busy filling the questionnaires.

1.7 Definition of operational terms

Logistics - is simply the movement or flow of material, information, and money between consumers and suppliers. Logistics refers that the happening of activities in one company, in addition to the purchase and delivery of raw materials, packaging, shipment, and transportation of goods to distributors (Thomas and Kopczak, 2005).

Disaster- The word “disaster” is an extreme event with a natural, technological or social consequence. This refers to casualties, destruction, hardship, damage, unhappiness, disruption or death (Şen and Esmer, 2017).

1.8. Organization of the Study

This paper was organized into five chapters. Chapter one deals with introduction, which consists of background of the study, statements of the problem, objectives of the study, significance of the study, research questions scope of the study and limitations. Chapter two addresses review of related literatures, which consists theoretical background and conceptual frameworks. Chapter three consists of the research methodology that will be applied in the study. The fourth Chapter focuses on the data presentation, analysis and interpretation of the study. Finally, chapter five focuses on summary conclusions and recommendations of the study.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Theoretical Review

2.1.1 The Concept and Definition of Logistics

There are various opinions about the term "logistics," one of which is the deviance from the Greek adjective "logistikos," which means "skilled in calculation." The title Logista was said to have been employed by military administrators during the Roman and Byzantine eras. However, other academics contend that the word "logistics" actually derives from the French word "logis," which means "dwelling." This phrase was first used to describe the art of planning the transportation, replenishment, and housing of soldiers in an army (that of Napoleon). As a multifaceted and dynamic function, logistics must be adaptable to the different demands and limits placed upon it as well as the environment in which it operates. As a result, numerous names have been employed, frequently interchangeably, in both literature and commerce. According to one generally held theory, the following is true: (Baker 2006).

Logistics = Supply + Materials Management + Distribution.

Until the ultimate distribution of the finished goods, logistics is also concerned with the physical and informational flows and storage formats of the raw materials (Baker 2006). In organizations, both public and private, logistics deals with the planning and control of material movements and related information. In general, its goal is to deliver the appropriate materials at the appropriate time, while maximizing a particular performance metric (such as reducing overall operating costs) and fulfilling a particular set of limitations such as a budget constraint (Baker 2006).

It's always interesting to debate the best approach to define logistics and the namesakes of its subfields. Here are a few definitions of logistics that may be found in textbooks and essays from various scholars: In order to create time and place utility, supply and demand must be coordinated and all operations that support movement must be managed as logistics CSCMP (2006), quoted in (Riopel et al. 2005). The

placing of resources at the proper time, location, cost, and quality is referred to as logistics. A member of the Chartered Institute of Logistics and Transport (UK, 2005, cited in Riopel et al. 2005)).

2.1.1.1 What is Logistics Management?

Logistics management is the planning, implementation, and control of the efficient, effective forward and reverse flow and storage of goods, services, and related information between the point of origin and the site of consumption in order to meet customer needs, according to CSCMP (2006), quoted in Riopel et al. (2005). In order to meet customer needs, it is also a component of supply chain management that plans, implements, and regulates the effective, efficient, forward- and reverse-flow and storage of goods, services, and related information between the point of origin and the point of consumption: Materials management, Channel management, Distribution (or physical distribution) and Supply-chain management (Riopel et al. 2005)..

2.1.2 Definition of Disaster

Disaster is defined as "a shocking event that seriously disrupts the functioning of a community or society, by causing human, material, economic, or environmental damage that cannot be handled by local agencies through standard procedures" by Jiang, & Yuan (2019). The disaster was defined by the United Nations Office for Disaster Risk Reduction (UNISDR) in 2020 as "a serious disruption of the functioning of a society, causing widespread human, material, or environmental losses which exceed the ability of affected society to cope using only its own resources" (UNISDR, 2020). The terms "hazard" and "vulnerability" were added to the definition of disaster by Alexander (2003) and UNISDR (2020), who described it as "a result of a mix of risks, vulnerability, and lack of measures.

The negative effects of disasters can be reduced by taking great care when organizing, planning, and using the right resources. Disaster was defined as "a dynamic mechanism that begins with the activation of a hazard and flows through the system as a series of events, in a logical sequence to produce a loss to life, property, and livelihood by adversely influencing the emergency systems" by Iyer and Mastorakis (2006) and Biswas and Choudhuri (2012).

It is possible to infer from the definitions above that a disaster is an unanticipated occurrence that interferes with a system's normal operation due to natural or technological causes and causes losses in terms of people, money, property, and the environment. To restore the initial balance, the involvement of the many community actors is necessary.

2.1.2.1 Disaster classification

The catastrophes' causes could be either natural or man-made occurrences. Moreover, the literature has a wide range of various classification standards. In light of this, disasters can be divided into a variety of categories, including natural and man-made disasters, disasters with slow or sudden onset, disasters with localized or dispersed slow onset, disasters with localized or dispersed sudden onset, and more (Zanjirani Farahani et al., 2011).

2.1.3 Disaster Management

Here, a conceptual framework for the catastrophe management process is presented. To create a foundational understanding, we employed literature to define fundamental terms. "Disaster management is a set of processes designed to be implemented before, during, and after disasters to prevent or mitigate their effects," claim Zanjirani Farahani et al. (2011). According to Hallikas (2004), it "aims to reduce or avoid potential losses from hazards, ensure prompt and appropriate assistance to disaster victims, and achieve rapid and effective recovery."

Disaster risk management "focuses on the organization and management of resources and responsibilities to address all aspects of emergencies and disasters, including preparedness, response, and initial recovery steps" (UN-SPIDER, 2020). According to Khan (2008), disaster risk management "includes sum total of all operations, programs, and measures which can be undertaken before, during, and after a disaster with the aim to avoid a disaster, reduce its impact, or recover from its losses."

2.1.3.1 Disaster Management Cycle

The disaster management cycle is the procedure by which authorities, organizations, and the general public prepare for and lessen the effects of catastrophes, respond during and right away after a disaster, and take action to recover. The four phases of disaster management described below do not always, or even frequently, take place one after the other or in this specific order. The length of each phase strongly depends on the intensity of the disaster, and phases of the cycle frequently overlap (Khan, 2008).

According to Tomasini and van Wassen hove (2009), the complete cycle of disaster management includes the following four steps: Addressing the proactive social element of emergencies is known as mitigation. This comprises policies and procedures that improve population resilience while reducing vulnerability. The actors in the supply chain for disaster aid should take precautions and set up reaction mechanisms in this stage to identify risks and vulnerabilities that society has not been able to mitigate. Responding to a calamity is the act of doing so. The final phase of disaster management is rehabilitation/recovery, during

which society, aided by organizations and infrastructure that have survived, works to lessen losses and bring some semblance of normalcy back into the lives of the afflicted (Tomasini and van Wassen hove, 2009).

2.1.3.1.1 Preparation

According to Tomasini and van Wassenhove (2009), it essentially implies "putting in place the response mechanisms to counter factors that society has not been able to mitigate (withstanding risks and vulnerability)". Depending on the nature of catastrophe, several preparation measures can be performed, such as free training, early planning for evacuation, and actions to lessen disaster losses (Tomasini and van Wassen hove, 2009).

2.1.3.1.2 Immediate disaster response

When a calamity occurs, regional actors immediately act according to their emergency plans. They will need to work in a setting with a destabilized infrastructure, regardless of how well-prepared these players are (Kovács and Spens, 2009). According to Kovács and Spens (2009), "the nature of most disasters requires an immediate response, hence supply chains demand to be designed and deployed at once despite the knowledge of the situation being very limited." According to Kovács and Spens (2009), "it is frequently unknown which resources are available, and even the participation and contribution of suppliers are unpredictable."

According to Kovács and Spens (2009), this "leads to many redundancies and duplicated efforts and materials." "In the immediate response phase, remote aid agencies assume the needs of disaster victims based on very limited information" (Kovács and Spens, 2009). As stated in "Assumptions need to be made regarding the kind and quality of supplies needed, the times and locations of demand, as well as the nature of the potential distribution of these supplies to any point of demand" (Kovács & Spens, 2009).

2.1.3.1.3 Reconstruction

According to Lodree and Taskin (2008), "the regional actors should s support victims in the location of their family and friends" during this phase where they "tried to restore some form of normality to the victims' lives". As was previously mentioned, the recovery stage is crucial since disasters can have lasting effects on a region. Disasters can also have a long-term impact on how businesses are run (Lodree and Taskin, 2008).

The United Nations (2015) defines disaster-risk management as "the systematic process of using administrative directives, organizations, and operational skills/capabilities to implement strategies,

policies, and improved coping mechanisms." This is done to decrease the negative effects of risks and the likelihood of tragedy. Through activities and procedures related to prevention, mitigation, and readiness, disaster-risk management initiatives seek to lessen the effects of risks when they are successful (UN-SPIDER, 2020).

2.1.4 Disaster Logistics

Disaster logistics, commonly referred to as humanitarian relief logistics, aims to provide for the requirements of hurt and vulnerable people as well as to lessen their suffering. Disaster logistics include planning, organizing, buying, moving, storing, controlling, and clearing customs (Thomas and Kopzack, 2005). In their meta-analysis, Kunz and Reinerb (2012) noted that modeling and simulation were the most often employed methods in the studies carried out between 1993 and 2011. Urbanization, climate change, and natural disasters are putting pressure on disaster relief efforts.

Humanitarian logistics can be handled with the use of decision science and ICT. According to their methodologies, comprehensive studies on catastrophe management can be categorized into 5 groups: studies using constructed models, reviews of the literature, surveys, interviews, and case studies. Collaboration with charitable groups like AFAT Akut Kzlay is one of the key components of disaster logistics (Lodree and Taskin, 2008).

Numerous studies have been conducted on disaster logistics. The majority of these studies concern models. The methodologies for model development have been highlighted in recent studies on catastrophe logistics, and the model development method has a propensity to be employed for site selection. The significance of location selection assisted by quantitative techniques becomes apparent at this point. In fact, the rising significance of site selection in studies is stressed by Peker et al. (2016), Rezaei-Malek et al. (2016), Konu (2014), and Gözaydn and Can (2013). In its study, the topic (2014) emphasized the significance of preparing humanitarian aid for a potential earthquake in Istanbul and created a site selection model using the data from the JICA (Japanese International Cooperation Agency) report. There are 29 demand points and 29 potential hubs for disaster response and support in this model. According to Gözaydn and Can (2013), it is important to develop both central and local hubs for the resources, tools, and equipment needed for humanitarian, medical, and search-and-rescue operations (Peker et al. 2016).

To be swift and efficient during the disaster response phase, those should be kept on hand before a crisis (en and Esmer 2017). Wright et al. expanded the literature's scope into homeland security, such as traffic and cyber space safety in routine emergency management, but not in the context of large-scale disasters. Altay and Green III provided a classification of disaster operations management literature in six

dimensions. Green and Kolesar examined prior studies on urban emergency services and routine emergencies highlighted the shortcomings in management engineering, soft skills, recovery planning, business continuity, and multi-agency cooperation.

Simpson and Hancock talked about the literature on both early urban emergency service systems and contemporary major disasters. developed a thorough network of literature citations suggested four potential study areas. Caunhye et al. studied emergency logistics optimization models for both the pre- and post-disaster operations phases. a thorough analysis of the literature's contents from the viewpoints of OR models, choices, goals, and restrictions.

The disaster operations management survey by Altay and Green was expanded by Galindo and Batta, who also incorporated analysis of the most prevalent assumptions in the industry. By grouping inventory regions and their articles, they hoped to improve the efficiency of disaster aid. They claimed that in order to fulfill help demands during disaster relief, logistics and inventory are the most crucial elements. It was underlined that the amount of inventory that had been prepared before the disasters in the shelters was adequate for just a limited time and that disparities in the inventory level in the shelters could lead to pandemonium. In contrast, Bealt et al. (2016) stress the need of collaboration between logistic activity providers and humanitarian groups in the study they conducted to enhance humanitarian logistics.

Peker et al. (2015) created a model for figuring out where in Erzincan would be the best place to put a distribution center. This model makes use of the VIKOR approach and the analytical hierarchy process (AHP). This states that "location, infrastructure, and cooperation" should be the most significant factors considered while choosing the best distribution center for Erzincan. In order to improve the performance of rescue teams and be better prepared for catastrophes, Raich et al. (2014) sought to uncover the elements affecting the supply chain in disasters. "Alay et al." Based on the components of management theory, it has developed an integrated logistics model.

Logistics for disasters; the stage of strategic planning that covers crucial applications such supplier selection and communication procedures; The stage of preparation during which the quantity and placement of the aid materials to be stored are decided decision-making occurs during the pre-incident response phase when a disaster like a storm is imminent. What occurs right away following a disaster and the post-incident intervention phase (Peker et al., 2016). The strategic phase is the most significant stage. According to Kovács and Spens, coordination is the most difficult scenario in catastrophe logistics, and this challenge can be attributed to several stakeholders. Therefore, he underlined that disaster logistics should use stakeholder theory(en and Esmer 2017).

The definition of "humanitarian logistics" given by Thomas and Kopczak (2005) is: "... the process of planning, implementing and controlling the efficient, cost-effective flow and storage of goods and materials, as well as related information, from the point of origin to the point of consumption for the purpose of alleviating the suffering of vulnerable people." Preparation, planning, procurement, transportation, warehousing, tracking and tracing, and customs clearance are all included in the role. The authors Kovács and Spens (2007) make a distinction between "aid work" and "disaster relief" as the two main streams of humanitarian logistics. "Aid work" is mostly concerned with providing ongoing assistance to those in need (such as development aid). The phrase "disaster relief" is typically used to describe initiatives that address sudden tragedies (whether they are natural or man-made).

Humanitarian logistics, according to the International Federation of Red Cross and Red Crescent Societies in 2015, "consists of procedures and systems involved in mobilizing people, resources, and knowledge to support vulnerable populations hit by natural disasters or complex situations. It aims to respond quickly, serve the greatest number of people possible, prevent shortages and waste, coordinate diverse gifts, and, most importantly, work within a tight budget.

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

Humanitarian logistics was defined as "a function that encompasses very different operations at different times, and as a response to various catastrophes" by Kovács and Spens (2010). The goal of all these operations is to help people survive. However, the type of assistance required following a natural disaster differs significantly from aid to support the development of a region, aid for famine relief, and management of refugee camps.

Humanitarian logistics, according to Daud (2016), "includes the process of mobilizing people, resources, skills, and expertise to assist the disaster's victim. As the link between catastrophe preparedness and response, procurement and distribution, and headquarters and the field, logistics functioned as the core of all mobilization activities in the humanitarian process. It can also be one of the most expensive

components of the relief operation, and the efficiency of the operation is always being assessed in order to optimize it and reduce operating costs while maximizing results (Daud, 2016).

The management of logistical flows during calamities is what humanitarian logistics refers to, according to the evidence. Its purpose is to save lives and provide the resources necessary to meet the needs as determined by the nature and severity of the disaster, the expected level of service, and the level of safety and security deemed appropriate.

2.2 Empirical Studies

Research has recently shifted to more complex, realistic routing issues such dynamic issues, delivery issues with time windows, and fleet composition (Sheu, 2007).

According to Sheu, (2007), problems with routing in emergency scenarios are starting to appear among these new, practical problems and provide a number of new difficulties. A survey of OR/MS research in disaster operations management was presented by Altay and Green in 2006. They demonstrated that the majority of the study was conducted in the pre-disaster phases of mitigation and readiness by breaking down the disaster operations management activities into four phases (mitigation, preparedness, response, and recovery). They determined that routing operations for providing enormous amounts of aid have received little attention among the response activities (such as emergency plan activation, evacuation, emergency rescue and medical care, and fire fighting).

A specific iteration of disaster relief operations was investigated by Haghani and Oh (2016) as a multi-commodity, multi-modal network flow model with time windows. They took into account the fact that a cargo can switch between modes at specific nodes, that some commodities have specified earliest delivery dates, and that arc capacity might vary over time. A time-space network was used to take into account the time component. Their objective was to reduce the overall cost of transportation. In order to solve issues with three modes, three sites of origin, and two destinations, heuristic solution techniques were proposed. In their 2002 study on helicopter routing, Barbarosolu et al. took into account a variety of unique constraints.

They reduced the cost of assigning a pilot to a particular helicopter and the cost of allocating a helicopter to an airbase. Zdamar et al. (2004) studied a multi-period transportation issue in which cars don't need to return to the depot since the model automatically develops new plans that take fresh requests for assistance into account. They therefore repeatedly solved their model at predetermined intervals while providing continuing aid with the aim of reducing the number of unmet demands over time.

Sheu (2007) created a model of an emergency logistics system made up of centers for distributing aid, suppliers of aid, and affected areas. Their work can be seen as a decision-support system that carries out the following processes: grouping of the afflicted areas, determining distribution priorities, allocating relief based on groups, and dynamic relief supply. Yi and Zdamar (2007) described an integrated site distribution model for planning logistical support and evacuation operations in which they take into account the transfer of injured persons to emergency units during evacuation and transfer. The distribution of medical workers across emergency units to sustain the affected individuals is a crucial component of their concept. Yi and Kumar (2007) utilized the Yi and Zdamar (2007) model without taking the facility location issue into account.

When applying their planning approach, Tzeng et al. (2007) investigated a multi-objective relief-distribution model to reduce overall costs and trip time and increase minimal satisfaction. Five collection stations, eight demand points, and four transfer depots were all taken into account by their network. A similar network with four supply nodes, four distribution nodes, eight demand nodes, and fuel stations was examined by Chern et al. in 2009. They take into account two categories of needs: incoming (such as food, drink, and medical supplies) and outgoing (such as dead, injured, and sound) requests, as well as the dates on which each category is due. In an emergency, the cost function may not be meaningful, so Campbell (2008) offered two alternative objective functions: one that reduces the average arrival time and the other that reduces the maximum arrival time.

The last mile distribution, as described by Balcik et al. (2008), is the route taken by recipients of catastrophes to get aid from regional distribution centers. They reduced the total cost of transportation as well as the fines associated with meeting demands for two different kinds of relief goods late or not at all. The two steps of their approach are (1) route creation, which generates a list of potential routes, and (2) route selection, which is based on a mathematical model. When compared to Balcik et al. (2008), the model of Zdamar et al. (2004) can be seen of as a bulk supply that is routed to local distribution centers. To improve routes from casualty pickup places to hospitals, Jotshi et al. (2009) devised a mechanism for dispatching and routing emergency vehicles in a post-disaster context. In their 2010 article, Balcik et al. examined the opportunities and constraints for study related to the supply chains for humanitarian aid.

Conceptually, our proposal is most similar to the Balcik et al. (2008) research because they took into account a heterogeneous restricted fleet, several vehicle routes, and two product types. They used two identical cars to address a single depot problem with four demand nodes.

Therefore, this study is different from the above all studies in that it focuses on the effect of logistics activity (Transportation, warehousing and procurement) in disaster responsiveness in south wollo zone International Medical Corps.

2.2.1 Challenge of Disaster Logistics

Disaster logistics is the process of organizing, carrying out, and managing the efficient, economical flow and storage of goods and materials, as well as associated information, from the point of origin to the point of consumption with the aim of easing the suffering of vulnerable individuals. Preparation, planning, purchasing, transportation, warehousing, tracking and tracing, and customs clearance are all included in this role.

Disaster For a number of reasons, logistics are essential to disaster aid. First, it is essential for key humanitarian programs like health, food, shelter, water, and sanitation to respond quickly and effectively. Second, it might be among the most expensive components of a relief operation because procurement and transportation are incorporated in the function. Third, since the logistics division is in charge of following products through the supply chain, it frequently houses the data that can be examined for post-event learning. The efficiency of suppliers and transportation providers, the cost and promptness of response, the appropriateness of donated commodities, and the management of information are all facets of execution that are reflected in logistics data. As a result, it is essential to the success of both ongoing operations and future plans (Stephen, 2008).

2.2.2 The Roles of Disaster Logistics in Disaster Management

The logistics component of any humanitarian endeavor accounts for the majority (about 80%) of the total effort. The adoption of the logistics function in disaster management has become increasingly important since the catastrophe of the Indian Ocean Tsunami in 2004 (Negi & Negi, 2020). The flood crisis brought to light the significant role that logistics play in the delivery of humanitarian aid by demonstrating how important productivity and speed in logistics are to response effectiveness during disaster relief (Negi & Negi, 2020). It has always been important to the attempt to provide aid (Trunick, 2005). According to one expert (Thomas, 2003), "Logisticians' capacity to procure, transport, and gather supplies at the site of a humanitarian relief operation determines the pace with which humanitarian aid is distributed following a disaster."

According to Negi and Negi (2020), logistics management manages the supply of medications, food products, clothing, and donated requests, as well as unrequested donations from various parties/agencies.

It also performs the procurement or distribution operations in any catastrophic accidents or emergencies. It includes the monitoring and management of resources, money, and information in addition to the flow of humanitarian aid. The definition of humanitarian logistics is "planning, implementing, and controlling activities for the reliable, cost-effective flow and storage of goods and materials, as well as related details, from point of origin to point of consumption, in order to reduce the suffering of vulnerable persons" (Thomas and Kopczak, 2005). "Logistics for humanitarians" is defined as "the processes and mechanisms involved in mobilizing people, money, expertise, and information to aid disaster-affected vulnerable people" (Van Wassenhove, 2006).

The main focus of disaster relief or humanitarian logistics operations is to "design the transport of first aid supplies, food, equipment, and emergency responders from supply points to a large number of geographically distributed destination nodes in the disaster region, as well as the safe and very rapid evacuation and transfer of people impacted by the disaster to health care centers" (Negi and Negi, 2020). "Logistical cooperation in the management of humanitarian assistance brings together people with expertise, experience, and skills in different fields in the disaster-affected region to help alleviate the suffering of the affected people through their collective efforts" (Negi & Negi, 2020).

Contrasting sharply with traditional logistical operations is humanitarian logistics. The primary goal of humanitarian logistics is to deliver aid to the victims, such as food, shelter, water, and medical care. It also highlights the need for search and rescue operations, life preservation, and the restoration of self-sufficiency; however, even these operations are hampered by logistical issues, inadequate disaster management plans, logistical issues with providing humanitarian aid, and an excess of financial resources (Inrix. 2016).

According to Negi and Negi (2020), the following important actions are required in the management of humanitarian logistics processes:

- a. Have a sufficient supply of high-quality products. Adequate arrangement and prioritize the use of restricted transportation. Adequate staging, storage, and transportation of movement goods. Transfer of people to the safest places in an appropriate way. Clear relocation from outside the affected area.

2.2.3 Effects of Logistics Activity on Responsive Disaster Relief

2.2.3.1 Transportation in Responsive Disaster Relief

2.2.3.1.1 Transportation

The most essential aspect of strategic logistics management is actually transportation. Costs of transportation are all expenses incurred when goods are moved between two locations. Transportation is the transportation of goods, resources, and services both internally and externally. (IGNOU 2011 Module in Logistics and Supply Chain Management).

Transportation is the inward and outgoing movement of goods, resources, and services from one place to another. It can also be described as the transfer of goods from one supply chain node to another. According to Nikbakhsh & Farahani (2011), transportation acts as a kind of lubricant to ensure that products move quickly and continuously back and forth through the chain. Additionally, it enables greater entry into more recent markets located far from the place of production.

Therefore, choosing a cost-effective method of transportation would be the first step in managing this transportation system properly. The best customer service available anywhere in the globe at the most affordable price promotes business growth and profitability. The effectiveness of an organization's operations is strategically impacted by its transportation infrastructure. Therefore, failure to choose the proper mode of transportation might negatively impact the effectiveness of delivering humanitarian supplies to the organization (Peker et al. 2016). Organizations that entail the actual movement of commodities need transport services that vary depending on the modality, claim Nikbakhsh & Farahani (2011). Depending on the type of goods that needs to be transferred and the urgency of the deliveries, the best suitable mode must be determined.

2.2.3.1.2 Transportation Management

System management ought to include managing the distribution function as well. To prevent delays at handoff points in the logistics network, "the activities of each function must be closely tied with the function downstream" (Thomas, 2003). The operations must be compatible conceptually and physically. Establishing alternative distribution channels with redundant routes and supply delivery techniques, for instance, would be one way to strengthen the distribution process (Lehrer et al., 2010). The distribution system should also include systems that allow for trade-offs between service level and transportation costs. A more responsive system enables lower inventory levels to be maintained despite more expensive, faster delivery (Lehrer et al., 2010).

2.2.3.1.3 Transport Performance Measures

Transport is a key component of logistics services and accounts for the largest share of logistics costs, according to Thomas, 2000. Therefore, improving transportation is essential to enabling the business to compete in the market. Four factors—finance, productivity, quality, and response time—should be prioritized and assessed in order to improve transport performance. Each element is made up of numerous terms; phrases from finance, like return on logistics assets and turnover of logistics asset, show financial success. The concentration and strategies of the company will, however, determine which parameters to use.

The general measurable parameters for each criterion are stated in the paragraph that follows. Financial metrics: Typically, total transportation expenses and related ratios like fleet assets are monitored to take capital consumption into account, especially for fleet owner companies. Quality metrics: This indicator places a strong emphasis on damage assessment and dependability. The percentage of claimed shipments, damage rates, on-time arrival percentages (OTAP), on-time departure percentages (OTDP), and other metrics are used to measure suppliers' performance. Cycle time metrics: Transit time, loading and unloading times, detention times, and delayed in traffic durations are all related to cycle time performance because time is truly money in the transportation business. The capital of the company might have an impact on cycle time in particular situations (Thomas, 2000). Time breakdown analysis can help logistics managers quickly identify the chain's bottleneck due to the multiple factors that affect transport time, which increases the chance of improving logistics performance (Peker et al., 2016).

2.2.3.2 Warehousing in Disaster Response Relief

According to Vrijhoef et Koselka (2000), warehouses present a chance to enhance information flows and operation optimization, lower inventory levels, and enable more dynamic distribution. The proper strategy, layout, warehouse operations, and material handling systems are necessary for a warehouse to operate well (Lehrer et al., 2010). According to Gu et al. (2010), there are five different types of decisions that must be made when solving warehouse design issues: choosing the operational strategy, determining the warehousing equipment, determining the overall structure of the warehouse, and calculating its size and layout. According to Koster et al. (2007) and Chan et Chan (2011), a warehouse project also has to define the policies for order fulfillment/picking, stocking, and stock rotation.

Despite the significance of the issue, few studies comprehensively address warehouse design methodologies, according to a study of the literature (Koster et al., 2007; Baker et Canessa, 2009; Gu et al., 2010).

Although there is a ton of information on the subject, it doesn't appear that any of these materials has been combined to form a generic warehouse concept (Rouwenhorst et al., 2010). Gu et al. (2010) claim that there is a disconnect between the published research and actual projecting and operation of warehouses. According to the authors, the state-of-the-art for warehousing project methodology must advance in order to create this bridge between academia and practice. In light of the above, the purpose of this study is to give a thorough analysis of the warehouse design literature from 1999 to 2015. The goal is to categorize the key topics that have been covered in those studies in a way that might be useful to experts in the field and contribute to ongoing study on the subject. For the sake of convenience, both installations with a primary focus on stocking and those with a primary focus on distribution are referred to as "warehousing" in this study. In order to make it easier to analyze the key ideas raised in the literature, a framework that takes into account three sets of important aspects in warehouse design—inputs, design and implementation, and outputs—has been developed.

This review differs from others (Van den Berg, 1999; Rouwenhorst et al., 2010; Gu et al., 2010) in that it takes a more comprehensive approach to warehouse design and its methods. Through procedural guidelines that unbiased validate the findings, a systematic evaluation of the literature makes it easier to summarize investigations (Khan et al., 2001; Tseng et al., 2008). The remainder of the essay is made up of the following: The systematic review framework is examined in Section 2, the literature technique is described in Section 3, the articles chosen for the study are portrayed (listed and categorized) in Section 4, and some findings are reached in Section 5.

2.2.3.3 Procurement in Responsive Disaster Relief

Relief agencies start an initial assessment right away (often one day after the event occurs). Thomas (2003) analyzed the anticipated amount of supplies needed to address the impacted population's relief requirements and assessed pre-positioned supplies that are currently on hand at the organizations' warehouses. Determined are the relief goods that must be purchased from vendors (Balcik & Beamon, 2008). This assessment is then converted into supply requirements as the next stage. The quantity, urgency, and type of materials that are needed to meet the need for relief supplies vary and are very unpredictable (Kovács & Spens, 2007).

During the reaction phase, supplies are primarily "pushed" to the disaster location, whereas the "pull" sourcing concept is primarily used during the reconstruction phase. Another important consideration is that customers who receive aid do not intentionally create demand or seek to "repurchase." As demand is determined by assistance organizations, no "real demand" is thereby created (Thomas, 2000).

Goods can be purchased in a variety of ways, such as in bulk or vendor storage until needed (Russell, 2005), and procurement can focus just on local suppliers or also take into account suppliers worldwide and vice versa (Blecken, 2010). Speed is of the utmost significance after a disaster because the first 72 hours are critical for giving help. The impacted area receives supplies as soon as feasible. Disaster response is given more efficiently, more quickly, and at affordable cost after the first 90 to 100 days. From that point on, relief supplies are sourced locally by humanitarian organizations (Van Wassenhove, 2006).

According to statistics, developed-country multinational corporations who are able to deliver enormous quantities are typically the suppliers of relief goods (Taupiac, 2001). On the other hand, having supplies on hand in the impacted area can significantly speed up activities. In order to reduce transportation costs and expedite delivery, another method of disaster response procurement involves making purchases from local and regional vendors rather than relying on long-distance donations (Nikbakhsh & Farahani, 2011). When local procurement is used, the impacted area's economy is also boosted. However, local sourcing frequently has issues with quality and may result in supply shortages. Local purchase can also lead to competition between groups, which drives up the cost of the aid (PAHO, 2001).

The main goals of global or international procurement are to obtain greater volumes at lower costs, while maintaining a constant level of quality. Using international suppliers, however, results in longer delivery times and greater shipping costs (Sowinski, 2003). For any relief endeavor, humanitarian groups would typically work with different providers (Falasca & Zobel, 2011).

In order to offer equitable opportunity to all enterprises interested, humanitarian groups frequently purchase aid commodities from international vendors through competitive bidding processes (Balcik & Beamon, 2008). Tendering strategies are rarely used, however, in major crisis situations because providing commodities promptly and in big quantities is essential (Taupiac, 2001). Humanitarian organizations initially discover possible suppliers who can fulfill the item and delivery requirements during the bidding procedure (Falasca & Zobel, 2011).

These qualified providers are then requested to submit bids. Humanitarian organizations analyze the purchase proposals as a last step before signing contracts with the chosen supplier. Supply shipments to the impacted areas then start. Humanitarian organizations started pre-purchasing agreements with suppliers, which in advance outline the quality and delivery standards for emergency products, to boost responsiveness. These contracts typically stipulate that vendors keep emergency supplies for aid organizations (Balcik & Beamon, 2008).

2.2.4 Research Hypothesis

The researcher developed the following hypothesis for further testing based on the specific objective of the study:

H1: Transportation has positive effect on disaster responsiveness in south wollo Zone
International Medical Corps.

H1: Warehousing has positive effect on disaster responsiveness in south wollo Zone
International Medical Corps.

H1: Procurement practices has positive effect on disaster responsiveness in south wollo
Zone International Medical Corps.

2.3 Conceptual Framework of the Study

Based on the above review of related literature, the researcher bases of these study conceptual framework are derived by considering the objective of the study, which focus on logistic activity (Transportation, Warehousing, and Procurement activity) which is independent variable and Effectiveness of Disaster Response (Speed of Response, Right Goods, Right time, Right Quality and Right Quantity) is dependant variable. In this study, effectiveness of disaster response will be defined as a dependent variable (which includes Speed of Response, Right Goods, Right time, Right Quality and Right Quantity) and Logistic activity (Transportation, Warehousing, and Procurement activity) will be the independent variable. The figure below shows the conceptual framework concerned with the effect of Logistic activity on Disaster responsiveness (Daud, 2016).

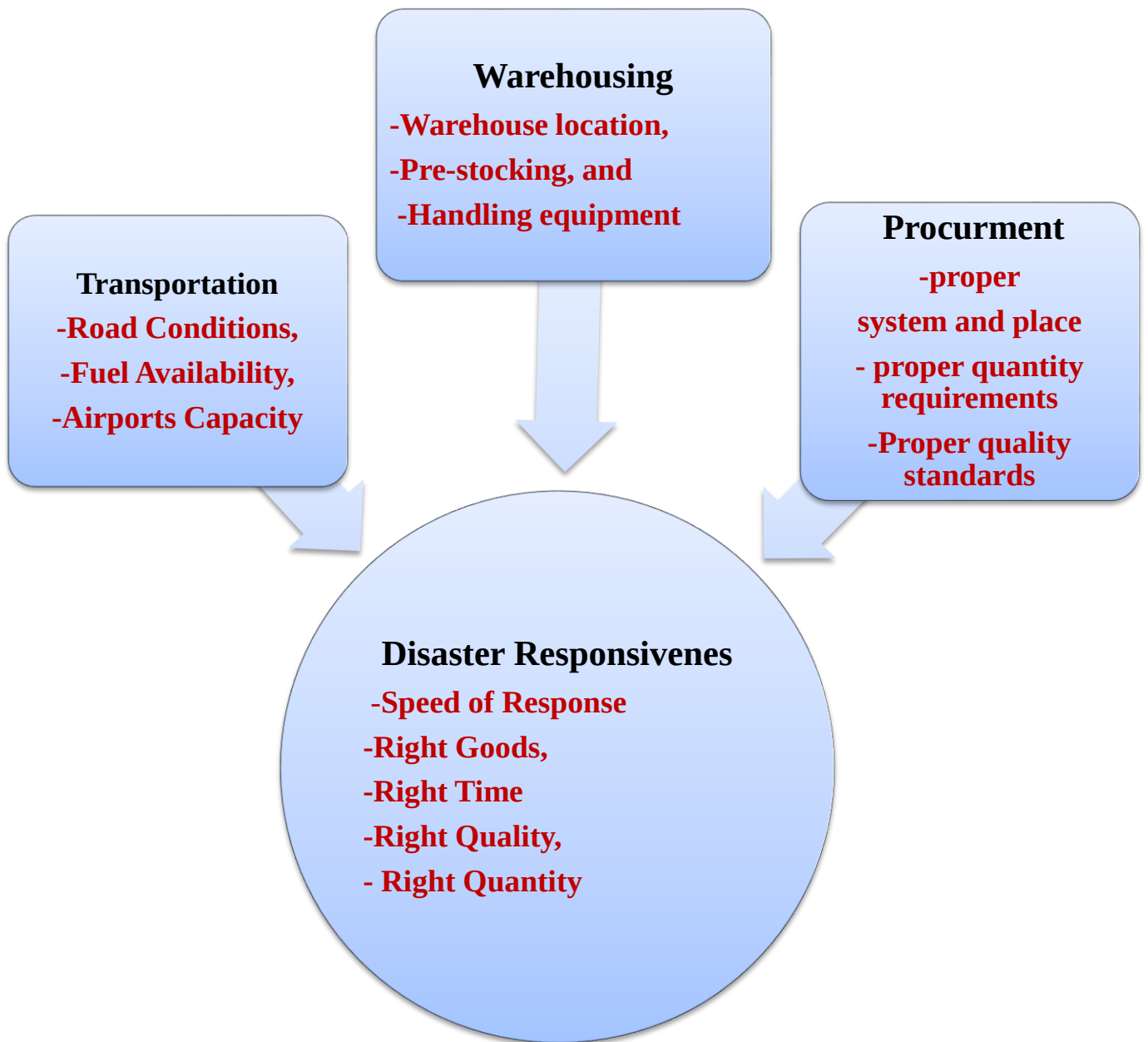


Figure 2.1 Conceptual Framework of the Study (Adapted from (Daud, 2016).)

CHAPTER THREE

METHODOLOGY

3.1 Description of the Study Area

South Wollo is one of the eleven administrative zones of the Amhara National Regional State which is located between 10° 10'N and 11° 41'N latitudes and 38° 28'E and 40° 5'E longitudes. The total area of the Zone is about 18,157.48 km², which is divided into 19 rural woredas and four administrative towns (Dessie, Kombolcha, Haik, and Mekaneselem) (ANRSPC 2017). Of the total area, 36.3%, 13.5%, 18.3% and 31.9% are covered by arable land, forest and bush lands, grazing land, and others (e.g. bare land, buildings). While the relative location of South Wollo is it is bordered on the south by North Shewa and the Oromia Region, on the west by East Gojjam, on the northwest by South Gondar, on the north by North Wollo, on the northeast by Afar Region, and on the east by the Oromia Special Zone and the Argobba special woreda. Its highest point is Mount Tabor in Amhara Sayint, 4247 meter above sea level. Towns in South Wollo include Kombolcha, Hayq, Dessie, Wuchale, Aqesta, Saint Ajibar, Degolo and Mekaneselem.

Based on the 2007 Census conducted by the Central Statistical Agency of Ethiopia (CSA), this Zone has a total population of 4,518,862, an increase of 18.60% over the 1994 census, of whom 1,248,698 are men and 1,270,164 women; with an area of 17,067.45 square kilometers, South Wollo has a population density of 147.58. While 301,638 or 11.98% are urban inhabitants, a further 3 individuals were reported to be pastoralists. A total of 1598,447 households were counted in this Zone, which results in an average of 4.21 persons to a household, and 1574,378 housing units. The largest ethnic group reported in South Wollo was the Amhara (96.33%); all other ethnic groups made up 3.67% of the population. Amharic is spoken as a first language by 98.65%; the remaining 1.35% spoke all other primary languages reported. 55.89% were Muslim, and 38.8% of the population said they practiced (Ethiopian Orthodox Christianity) 5% protestant (CSA, 2007),

3.2 Research Approach

The researcher used mixed research approach that is both quantitative and qualitative data gathering tools were employed. The quantitative approach provides with generalized and representative findings, while the qualitative gives in depth narration and contextualization to findings. According to Creswell (2014), mixed research approach involves collecting both quantitative and qualitative data, integrating the two

forms of data. The combination of these forms of data provides different kinds of information (closed-ended data in the case of quantitative and open –ended data in the case of qualitative) in response to research questions (Creswell, 2005).

According to Kotheri (2004) using qualitative and quantitative methods at the same time can increase the reliability of the study. Quantitative research methods gather and analyses numerical data to describe the level of logistic activity and its disaster responsiveness, while the qualitative gives in depth narration and contextualization to findings related to the effect of logistics activity on disaster responsiveness in South Wollo Zone International Medical corps.

3.3 Research Design

The aim of this study was to assess the effect of logistics practice on disaster responsiveness in south wollo zone International Medical Corps. Hence, this study was used descriptive and explanatory research design to collect both primary and secondary data sources and analyze based on a quantitative and qualitative research approach. This design helps to assess the effect of logistics activity on disaster responsiveness. The purpose of this research was to identify if there is a relation between the predictor variable and the response variable. The predictor variables (independent) are logistic practices, and the response variable (dependent) is disaster responsiveness. In addition, to investigate the relationship of the variables, the influence of independent variable (logistics practice) on dependent variable on (disaster responsiveness) is undertaken through Pearson’s correlation and multiple linear regression analysis that were used to assess both relationships and effects as per the objective of the study. Creswell (2005) asserted that, regression used for explaining a relationship among variables you are interested in determining whether one or more variables might influence another variable.

3.4 Target Population of the Study

The employees of International Medical Corps who work in disaster response, its support system and related services purposively selected as a target population for this study because it is one of the humanitarian organizations where significant works related to disaster response, support system and related services in addition since these employees are currently working in the region they have a good knowledge of the Issue. Therefore, all 1200 employees working in International Medical Corps were the target population of the study.

3.5 Sampling Technique

The researcher purposively selected South Wollo Zone International Medical Corps since the researcher is on working in the organization and this organization is currently actively participating in the region. Therefore, the researcher can get relatively better and reliable information about the issue.

The researcher selected all the 300 employees of South wollo zone International Medical Corps employees as a sample size by using Comprehensive or census sampling techniques. Finally, data were collected from those respondents by using questionnaire and Interview.

3.6 Source of Data

The researcher used both primary and secondary sources of data to undertake this study. According to Biggam (2008), primary data is the information that the researcher finds out by him/herself regarding a specific topic. Therefore, respondents and Interviewees were used as a primary source of data and the secondary data were obtained from books, websites (internet), articles, journals and other available sources.

3.7 Data Type

The researcher collected both quantitative and qualitative data type to achieve the specified objectives. The quantitative data were collected using questionnaire while the qualitative data were collected through interviewee.

3.8 Data Collection Procedure

To gather the primary data from employees of International Medical Corps a questionnaire were distributed to the respondents and Interview was conducted to the concerned bodies. The close ended questions were prepared using a liker scale anchored by strongly disagree, disagree, undecided, agree and strongly agree. The closed ended questions were adapted from the review of related literature. As Neman (2003) explained, it is a process of asking many people the same questions and examining their answers research questions.

3.9 Methods of Data Analysis and Presentation

After the data was collected, it was necessary to utilize statistical techniques to analyze the information as this study is quantitative and qualitative in nature. Therefore, the survey data was processed using an SPSS (version 26.0). First the relevant data were coded, summarized and then transferred to SPSS to be analyzed and presented. Data were then analyzed using descriptive and inferential statistics. The researcher used descriptive statistics to analyze the collected data. Descriptive analysis was carried out to determine mean, standard deviation. The descriptive results were presented in tables and figures.

Inferential statistics, Pearson's correlation and multiple linear regression analysis were used to assess both relationships and effects as per the objective of the study. Subsequently, the researcher employed correlation analysis to investigate the relationship between logistic activity and disaster responsiveness. For qualitative data the researcher used in-depth narration and used to support the finding of the quantitative analysis

3.10 Validity and reliability

In order to keep the validity and reliability of the study, the researcher was carried out the following activities. First, the questionnaires were taken from the review of the related literature (Daud, 2016) and the questionnaires prepared by other scholars. Next some modification was made to meet the needs of this study. After wards, they were given to the researcher's advisor to be commented.

After some improvements have been made, they were administered to 20 selected respondents, which are 10 employees of Concern worldwide a similar humanitarian organization which is also actively participated in the region and 10 none sampled employees of the organization for pre test.

Furthermore, they were tested for their internal reliability using Crombach alpha and it was found that a Crombach alpha coefficient of 0.84 which means the questionnaire were reliable. Since, a Crombach alpha coefficient varies from 0 to 1 with 1 indicating perfect reliability and 0 doesn't have internal reliability; 0.8 denotes an acceptable level of internal reliability. It further said that if the Combat's alpha coefficient is greater than 0.9 implies excellent, greater than 0.8 is good, greater than 0.7 is acceptable, between 0.6 and 0.7 is questionable, between 0.5 and 0.6 is poor, and less than 0.5 is unacceptable.

3.11 Ethical consideration

The consideration of ethical issues is necessary for ensuring the privacy and safety of respondents. Among the significant ethical issues that were considered in the research process is consent and confidentiality. In order to secure, the consent of respondents all-important details of the study were explained which includes its aims and purposes. The respondents were not being forced to participate in the research. The confidentiality of participants was ensured by not disclosing their names and personal information in the research. All information's that were collected from the respondents were preserved with confidentiality without disclosure of the respondents' identity. Moreover, no information were modified or changed, hence information and literatures collected for the purpose of this study were appreciated in the reference list.

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS OF RESULTS

4.1 Introduction

This section deals with data presentation and analysis of results, which were obtained from respondents through questionnaire. Based on this, 300 questionnaires were distributed to the employees of South Wollo Zone International Medical Corps to assess the effect of logistics practices on disaster responsiveness of south wollo Zone International Medical Corps. The entire distributed questionnaire, 300 (100%) were returned then they were analyzed and presented.

4.2. Demographic Profile of Respondents

These portions discuss the demographic characteristics of the respondents. The demographic data contains sex, age, educational status, marital status and work experience of respondents that is the employees of south wollo Zone International Medical Corps

Table 4.1 Demographic Characteristics of the Respondents

No	Demographic Characteristics	Category	Respondents	
			Frequency	%
1	Gender	Male	195	65.0
		Female	105	35.0
		Total	300	100
2	Age	< 25	97	32.3
		26 – 30	12	4.0
		31 – 35	14	4.7
		36 – 40	8	2.7
		41 and above	169	56.3
		Total	300	100
3	Educational Status	Certificate	-	-
		Diploma	18	6.0
		First Degree	178	59.3
		Second Degree and Above	104	34.7
		Total	300	100
4	Marital Status	Single	42	14.0
		Married	151	50.3
		Divorced	69	23.0
		Widowed	38	12.7
		Total	300	100
5	Work Experience	< 2 years	-	-
		2 – 5 years	50	16.7
		6 – 10 years	100	33.3

		Over 10 years	150	50.0
		Total	300	100

Source: The researcher Survey, 2023

As indicated in the above table 4.1 item 1, the sex ratio of the respondents show that, 195 (65.0%) of the respondents were males and 105 (35.0%) of them were females. This reveals the majority of the respondents were male.

As it is shown in item 2, the age of the respondents show that, 97 (32.3%) aged less than 25 years, 12 (4.0%) 26-30 years, 14 (4.7%) 31- 35 years, 8 (2.7%) 36 – 40 years and 169 (56.3%) of them were aged 41 and above. This discloses that the majority of the respondents were aged above 36 years.

As it is indicated in item 3, 18 (6.0%) of the respondents holds diploma, 178 (59.3%) holds first Degree and 104 (34.7%) of the respondents holds second degree and above. This reveals the majority of the respondents were holds first degree.

As it is described in item 4, the marital status of the respondents showed that, 42(14.0%) of the respondents were single, 151 (50.3%) married, 69 (23.0%) divorced and 28(10%) are widowed. This depicts them the majority of beneficiary respondents were married.

As it is shown in item 5, the work experience of the respondents showed that, 50 (16.7%) of the employees worked for 2 – 5 years, 100 (33.3%) 6 – 10 years and 150 (50%) of them were worked over 10 years in the organization.

In general, it is a challenge for female, 41 and above aged and married employees who have family and children to travel to remote area which is affected by disaster and give responsive disaster relief.

4.3 Data Obtained from Employees of IMC

4.3.1 Transportation condition of the Organization

Table 4.2 Transportation condition of the Organization

<i>No</i>	<i>Items</i>	<i>Mean</i>	<i>S.D</i>
1	In your organization employee has transportation access to reach in duty location on time.	2.13	1.2
2	In your organization there is a service provided by an organization for work purposes in disaster response activities.	2.03	1.1
3	In your organization evaluation and monitoring of the organization transportation system has been done at least ones per month.	1.80	0.91
4	In your organization there is no transportation delay in providing humanitarian needs to relief disaster.	2.08	1.2
5	In your organization the statuses of vehicles are good to transport humanitarian materials to affected communities in disaster responsiveness	2.09	1.2
6	In your organization transport infrastructure has conducive status for the activities of Disaster responsiveness	2.10	1.3
Grand Mean		2.04	

Source: The researcher Survey, 2023

As it is indicated in the above table 4.2 item 1, the respondents were asked about whether the employee of International Medical Corps has transportation access to reach in duty location on time or not, 110 (36.7%) of the respondents responded that they strongly disagree, 123 (41.0%) disagree, 7 (2.3%) undecided, 38 (12.7%) of them agree and 22 (7.3%) of them strongly agree. This indicates that, 240 (80%) of the respondents expressed their disagreement while 60 (20 %) of them their agreement. According to Oxford's (1990) frequency scale averages, variable scores between 3.5 and 5.0 are regarded as high in frequency or agreement, and scores between 2.5 and 3.4 are viewed as medium or undecided. Those variables that score between 1.0 and 2.4 are considered as low or disagreement. Therefore, the mean 2.13 and the standard deviation 1.243 portrays and thought that the employee of International Medical Corps has no regular transportation or service access to reach in duty location on time.

Item 2, depicts that whether there is a service provided by the organization for work purposes in disaster response activities or not, 108 (36.0%) of the respondents responded that they strongly disagree, 138 (46.0%) disagree, 7 (1.7%) undecided, 26 (8.7%) of them agree and 23 (7.7%) of them strongly agree. This indicates that, 251 (83.7%) of the respondents expressed their disagreement while 49 (16.4 %) of them their agreement. With a mean of 2.03 and the standard deviation 1.162 portrays and thought that there is no service provided by the organization for work purposes in disaster response activities.

Item 3, shows that whether the evaluation and monitoring of the organization transportation system has been done at least ones per month or not, 130 (43.3%) of the respondents responded that they strongly disagree, 130 (43.3%) disagree, 20 (6.7%) undecided, 10 (3.3%) of them agree and 10 (3.3%) of them strongly agree. This indicates that, 260 (86.7%) of the respondents expressed their disagreement while 40 (13.3%) of them their agreement. The mean 1.80 and the standard deviation 0.91 portrays and thought that there is no service provided by the organization for work purposes in disaster response activities.

Item 4, displays that whether there is no transportation delay in providing humanitarian needs to relief disaster or not, 111 (37.0%) of the respondents responded that they strongly disagree, 131 (43.7%) disagree, 8 (2.7%) undecided, 22 (7.3%) of them agree and 28 (9.3%) of them strongly agree. This indicates that, 250 (83.4%) of the respondents expressed their disagreement while 50 (16.6%) of them their agreement. The mean 2.08 and the standard deviation 1.236 portrays and thought that there is transportation delay in providing humanitarian needs to relief disaster.

Item 5, presents that whether the status of vehicles are good to transport humanitarian materials to affected communities in disaster responsiveness or not, 110 (36.7%) of the respondents responded that they strongly disagree, 129 (43.0%) disagree, 10 (3.3%) undecided, 26 (8.7%) of them agree and 25 (8.3%) of them strongly agree. This indicates that, 249 (83%) of the respondents expressed their disagreement while 51 (17%) of them their agreement. The mean 2.09 and the standard deviation 1.222 portrays and thought that the status of vehicles are not good to transport humanitarian materials to affected communities in disaster responsiveness.

Item 6, portrays that whether the transport infrastructure has conducive status for the activities of disaster responsiveness or not, 111 (37.0%) of the respondents responded that they strongly disagree, 130 (43.3%) disagree, 6 (2.0%) undecided, 23 (7.7%) of them agree and 30 (10.0%) of them strongly agree. This indicates that, 247 (82.3%) of the respondents expressed their disagreement while 53 (17.7 %) of them their agreement. The mean 2.10 and the standard deviation 1.261 portray and thought that the transport infrastructure has poor status for the activities of disaster responsiveness.

4.3.2 Warehouse condition of the Organization

Table 4.3 Warehousing condition of the Organization

<i>No</i>	<i>Items</i>	<i>Mean</i>	<i>S.D</i>
1	In your organization south wollo zone IMC the warehouse structure is well organized	2.10	1.2
2	In your organization south wollo zone IMC the stock handling of is suitable for disaster relief activities	2.01	1.1
3	In your organization south wollo zone IMC emergency kits are available in the warehouse of	2.05	1.1
4	In your organization south wollo zone the warehouse is accessible for disaster relief activities	2.00	1.2
5	In your organization south wollo zone IMC the warehouse is well secured	1.98	1.1
Grand Mean		2.03	

Source: The researcher Survey, 2023

Table 4.3 item 1, depicts whether the warehouse structure of south wollo zone IMC is well organized or not, 97 (32.3%) of the respondents responded that they strongly disagree, 149 (49.7%) disagree, 4 (1.3%) undecided, 26 (8.7%) of them agree and 24 (8.0%) of them strongly agree. This indicates that, 250 (83.3%) of the respondents expressed their disagreement while 50 (16.7 %) of them their agreement. Therefore, the mean 2.10 and the standard deviation 1.2 portray and thought that the warehouse structure of south wollo zone IMC is not well organized.

Item 2, show that whether the stock handling of south wollo zone is suitable for disaster relief activities, 102 (34.0%) of the respondents responded that they strongly disagree, 151 (50.3%) disagree, 6 (2.0%) undecided, 23 (7.7%) of them agree and 18 (6.0%) of them strongly agree. This indicates that, 259 (86.3%) of the respondents expressed their disagreement while 41 (13.7 %) of them their agreement. The mean 2.01 and the standard deviation 1.1 portray and thought that the stock handling of south wollo zone is IMC is not suitable for responsive disaster relief activities.

Item 3, display that whether emergency kits are available in the warehouse of south wollo zone IMC or not, 104 (34.7%) of the respondents responded that they strongly disagree, 144 (48.0%) disagree, 5 (1.7%) undecided, 29 (9.7%) of them agree and 18 (6.0%) of them strongly agree. This indicates that, 253 (84.3%) of the respondents expressed their disagreement while 47 (15.7 %) of them their agreement. The mean 2.05 and the standard deviation 1.1 portray and thought that emergency kits are not available in the warehouse of south wollo zone IMC.

Item 4, portrays that whether the warehouse of south wollo zone is accessible for disaster relief activities, 115 (38.3%) of the respondents responded that they strongly disagree, 133 (43.3%) disagree, 8 (2.7%) undecided, 24 (8.0%) of them agree and 20 (6.7%) of them strongly agree. This indicates that, 256 (85.3%) of the respondents expressed their disagreement while 44 (14.7 %) of them their agreement. The mean 2.00 and the standard deviation 1.2 portray and thought that the warehouse of south wollo zone is not well accessible for disaster relief activities.

Item 5, indicated that whether the warehouse of south wollo zone IMC is well secured, 109 (36.3%) of the respondents responded that they strongly disagree, 147 (49.0%) disagree, 4 (1.3%) undecided, 21 (7.0%) of them agree and 19 (6.3%) of them strongly agree. This indicates that, 260 (86.7%) of the respondents expressed their disagreement while 40 (13.3 %) of them their agreement. The mean 1.98 and the standard deviation 1.1 portray and thought that the warehouse of south wollo zone IMC is not well secured.

4.3.3 Procurement condition of the Organization

Table 4.4 Procurement condition of the Organization

<i>No</i>	<i>Items</i>	<i>Mean</i>	<i>S.D</i>
1	You feel that your organization has a proper procurement system and place	2.02	1.21
2	You believe the procured materials or services most of the times are up to the quality standards of the requestor.	2.27	1.38
3	You believe the procured materials or services most of the times are up to the quantity requirements of the requestor.	2.10	1.26
4	In your organization, there is transparency between program or requestor staff with procurement staff	2.19	1.35
5	In your Organization that all the materials or service procured have been produced with the organization code of conduct and ethics standard	2.14	1.34
Grand Mean		2.14	

Source: The researcher Survey, 2023

Table 4.4 item 1, indicated that whether they feel that their organization has a proper procurement system and place or not, 121 (40.3%) of the respondents responded that they strongly disagree, 123 (41.0%) disagree, 7 (2.3%) undecided, 27 (9.0%) of them agree and 22 (7.3%) of them strongly agree. This indicates that, 251 (83.7%) of the respondents expressed their disagreement while 49 (16.3 %) of them their agreement. Therefore, the mean 2.02 and the standard deviation 1.21 portray and thought that their organization has a poor procurement system and place.

Item 2, portrays that whether they believe that the procured materials or services most of the times are up to the quality standards of the requestor or not, 109 (36.3%) of the respondents responded that they strongly disagree, 110 (36.7%) disagree, 6 (2.0%) undecided, 42 (14.0%) of them agree and 33 (11.0%) of them strongly agree. This indicates that, 225 (75.0%) of the respondents expressed their disagreement while 75 (25.0 %) of them their agreement. The mean 2.27 and the standard deviation 1.38 portray and thought that the procured materials or services most of the times are not up to the quality standards of the requestor.

Item 3, depicts that whether they believe that the procured materials or services most of the times are up to the quantity requirements of the requestor or not, 120 (40.0%) of the respondents responded that they strongly disagree, 112 (37.3%) disagree, 9 (3.0%) undecided, 36 (12.0%) of them agree and 23 (7.7%) of them strongly agree. This indicates that, 241 (80.3%) of the respondents expressed their disagreement while 59 (19.7 %) of them their agreement. The mean 2.10 and the standard deviation 1.26 portray and thought that the procured materials or services most of the times are not up to the quantity requirements of the requestor.

Item 4, display that whether in their organization, there is transparency between program or requestor staff with procurement staff or not, 129 (40.0%) of the respondents responded that they strongly disagree, 103 (34.3%) disagree, 7 (2.3%) undecided, 41 (13.7%) of them agree and 29 (9.7%) of them strongly agree. This indicates that, 230 (76.7%) of the respondents expressed their disagreement while 70 (23.3 %) of them their agreement. The mean 2.19 and the standard deviation 1.35 portray and thought that there is no transparency between program or requestor staff with procurement staff.

Item 5, show that whether in their organization all the materials or service procured have been produced with the organization code of conduct and ethical standards or not, 124 (41.3%) of the respondents responded that they strongly disagree, 106 (35.3%) disagree, 6 (2.0%) undecided, 33 (11.0%) of them agree and 31 (10.3%) of them strongly agree. This indicates that, 236 (78.7%) of the respondents expressed their disagreement while 64 (21.3%) of them their agreement. The mean 2.14 and the standard deviation 1.34 portray and thought that all the materials or service procured have not been produced with the organization code of conduct and ethical standards.

4.3.4 Disaster Responsiveness

Table 4.5 Disaster Responsiveness

<i>No</i>	<i>Items</i>	<i>Mean</i>	<i>S.D</i>
1	In your organization disaster relief items are well organized and the employees are ready to give effective disaster response	2.03	1.16
2	In your organization emergency disaster relief response giving team are organized to give responsive disaster relief in times of emergency disaster	2.08	1.24
3	In your organization the logistics staff is ready to give effective response to disasters since it have been emerged in region.	2.13	1.34
4	In your organization there is a quantified out puts in responsive disaster logistics activities	2.00	1.16
5	In your organization the transportation infrastructure, warehousing infrastructure and procurement practices are well organized and coordinated to give responsive disaster relief.	1.98	1.11
Grand Mean		2.04	

Source: The researcher Survey, 2023

Table 4.5 item 1, portrays that whether the disaster relief items of the organization are well organized and the employees are ready to give effective disaster response or not, 108 (36.0%) of the respondents responded that they strongly disagree, 143 (47.7%) disagree, 5 (1.7%) undecided, 21 (7.0%) of them agree and 23 (7.7%) of them strongly agree. This indicates that, 256 (85.3%) of the respondents expressed their disagreement while 44 (14.7 %) of them their agreement. Therefore, the mean 2.03 and the standard deviation 1.16 portray and thought that the disaster relief items of the organization are not well organized and the employees are not ready to give effective disaster response.

Item 2, show that whether emergency disaster relief response giving team were organized to give responsive disaster relief in times of emergency disaster or not, 111 (37.0%) of the respondents responded that they strongly disagree, 131 (43.7%) disagree, 8 (2.7%) undecided, 22 (7.3%) of them agree and 28 (9.3%) of them strongly agree. This indicates that, 250 (83.3%) of the respondents expressed their disagreement while 50 (16.7 %) of them their agreement. The mean 2.08 and the standard deviation

1.24 portray and thought that emergency disaster relief response giving team was not organized to give responsive disaster relief in times of emergency disaster.

Item 3, indicates that whether the logistics staff of IMC is ready to give effective response to disasters since they have been emerged in South Wollo zone or not, 122 (40.7%) of the respondents responded that they strongly disagree, 112 (37.3%) disagree, 3 (1.0%) undecided, 30 (10.0%) of them agree and 33 (11.0%) of them strongly agree. This indicates that, 237 (79.0%) of the respondents expressed their disagreement while 63 (21.0 %) of them their agreement. The mean 2.13 and the standard deviation 1.34 portray and thought that the logistics staff of IMC is not ready to give effective response to disasters since they have been emerged in South Wollo zone.

Item 4, depicts that whether there is a quantified out puts in south wollo zone International Medical corps responsive disaster logistics activities or not, 115 (38.3%) of the respondents responded that they strongly disagree, 133 (44.3%) disagree, 8 (2.7%) undecided, 24 (8.0%) of them agree and 20 (6.7%) of them strongly agree. This indicates that, 256 (85.3%) of the respondents expressed their disagreement while 44 (14.7 %) of them their agreement. The mean 2.00 and the standard deviation 1.16 portray and thought that there is no quantified out puts in south wollo zone International Medical corps responsive disaster logistics activities.

Item 5, display that whether the transportation infrastructure, warehousing infrastructure and procurement practices of south wollo zone International Medical Corps are well organized and coordinated to give responsive disaster relief or not, 109 (36.3%) of the respondents responded that they strongly disagree, 147 (49.0%) disagree, 4 (1.3%) undecided, 21 (7.0%) of them agree and 19 (6.3%) of them strongly agree. This indicates that, 260 (86.7%) of the respondents expressed their disagreement while 40(13.3 %) of them their agreement. The mean 1.98 and the standard deviation 1.11 portray and thought that the transportation infrastructure, skilled manpower and warehousing infrastructure of south wollo zone International Medical Corps are not well organized and coordinated to give responsive disaster relief.

4.4 The Effect of Independent Variables on Dependent Variables

4.4.1 Correlation Analysis

Two-tailed Pearson correlation coefficient was employed to explore the association between the independent variables (Transportation, Warehousing and Procurement) and the dependent variable (Disaster Responsiveness). The correlation coefficient value $r = -1$ means that there is perfect negative relation of variables, the correlation coefficient $r = +1$ means there is positive relation of variables and the coefficient value $r = 0$ or closer to zero means that there is no relation between the variables. Furthermore, correlation coefficients found in $0.1 < |r| < 0.3$ represent a weak relationship, correlation coefficients found in $0.3 < |r| < 0.5$ represent a moderate relationship and correlation coefficients found in $|r| > 0.5$ show a strong relationship (Cohn, 1988)

Table 4.6 Pearson Correlation Analysis

Correlations					
		Transport	Warehousing	Procurement	Disaster Responsiveness
Disaster Responsiveness	Pearson Correlation	.860**	.879**	.208**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	300	300	300	300
**. Correlation is significant at the 0.01 level (2-tailed).					

Source: The researcher Survey, 2023

Correlation between Transportation and Disaster Responsiveness in IMC South Wollo Branch

Table 4.8 depicts the results of conducted correlation results and the test revealed significant and strong positive relationship between transportation and disaster responsiveness with a correlation coefficient value of $r = 0.860^{**}$ and $p < 0.01$. This correlation analysis indicated that, transportation and disaster responsiveness have strong positive relationship. That is if the transportation activity of the organization is good it will increase the activity of disaster responsiveness or if transpiration activities are poor it will decrease the activity of disaster responsiveness. In other words, both are in a direct relationship with one another.

Correlation between Warehousing and Disaster Responsiveness in IMC South Wollo Branch

Table 4.8 depicts the results of conducted correlation results and the test revealed significant and strong positive relationship between warehousing and disaster responsiveness with a correlation coefficient value of $r = 0.879^{**}$ and $p < 0.01$. This correlation analysis indicated that, warehousing and disaster responsiveness have strong positive relationship. That is if the warehousing condition of the organization is good it will increase the activity of disaster responsiveness or if the warehousing condition of the organization are poor it will decrease the activity of disaster responsiveness. In other words, both are in a direct relationship with one another.

Correlation between Warehousing and Disaster Responsiveness in IMC South Wollo Branch

Table 4.8 depicts the results of conducted correlation results and the test revealed significant and weak positive relationship between procurement and disaster responsiveness with a correlation coefficient value of $r = 0.208^{**}$ and $p < 0.01$. This correlation analysis indicated that, procurement and disaster responsiveness have weak positive relationship. That is if the procurement activities of the organization is good it will increase the activity of disaster responsiveness or if the procurement condition of the organization are poor it will decrease the activity of disaster responsiveness. In other words, both are in a direct relationship with one another.

4.5. Model Summary of the Regression Analysis

Table 4.7 Model Summary of the Regression Analysis

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.938 ^a	.879	.878	1.31484

a. Predictors: (Constant), Procurement, Warehouse, Transport

Source: The researcher Survey, 2023

As shown in Table 4.7 the 'R' column represents the value of the multiple correlation coefficient and is considered to be one measure of the quality of the prediction of the dependent variable (disaster responsiveness); In this case, the value $R = 0.938$, in this study, indicates a good level of prediction. The 'R square' column represents the R^2 value (also known as the coefficient of determination), which is the proportion of variance in the dependent variable (disaster responsiveness) that can be explained by the

independent variables (the factors that affect disaster responsiveness). In this study the independent variables explained 87.9% of the variability of our dependent variable, while the rest were influenced by other factors which were not included in this study. If the Adjusted R Square statistics is considered, the factors that affect disaster responsiveness explained 87.8% of the variant of disaster responsiveness

Table 4.8 Analysis of Variance (ANOVA) for the Regression Analysis

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3718.863	3	1239.621	717.044	.000 ^b
	Residual	511.723	296	1.729		
	Total	4230.587	299			
a. Dependent Variable: Disaster Responsiveness						
b. Predictors: (Constant), Procurement, Warehouse, Transport						

Source: The researcher Survey, 2023

The F ratio in the above ANOVA table tests whether the overall regression model is a good fit for the data. The table shows that the independent variables statistically significantly predict the dependent variable, $F(3, 296) = 717.044$, $p < 0.01$. That means the regression model is a good fit of the data.

Table 4.9 Regression Coefficient Analysis Result

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.044	.252		-.175	.861
	Transport	.386	.037	.443	10.492	.000
	Warehouse	.438	.037	.502	11.929	.000
	Procurement	.168	.013	.269	13.229	.000
a. Dependent Variable: Disaster Responsiveness						

Source: The researcher Survey, 2023

Effect of Transportation on Disaster Responsiveness

Table 4.9 portrays the multiple linear regression analysis results. The regression coefficient in the standardized coefficient 'B' column indicated that transpiration with regression coefficient $B = 0.443$ ($P < 0.001$) positively forecast disaster responsiveness. These results propose that poor performance of transportation activity will decrease disaster responsiveness significantly by 44.3 %.

When the performance of transportation activity decreases it will decrease disaster responsiveness. Transpiration strongly and significantly positively affects disaster responsiveness in International Medical Corps South Wollo Zone Branch.

Effect of Warehousing on Disaster Responsiveness

Table 4.9 portrays the multiple linear regression analysis results. The regression coefficient in the standardized coefficient 'B' column indicated that warehousing with regression coefficient $B = 0.502$ ($P < 0.001$) positively forecast disaster responsiveness. These results propose that poor condition of warehousing will decrease disaster responsiveness significantly by 50.2 %.

When the condition of warehousing decreases it will decrease disaster responsiveness. Warehousing strongly, significantly and positively affects disaster responsiveness in International Medical Corps South Wollo Zone Branch.

Effect of Procurement on Disaster Responsiveness

Table 4.9 portrays the multiple linear regression analysis results. The regression coefficient in the standardized coefficient 'B' column indicated that procurement with regression coefficient $B = 0.269$ ($P < 0.001$) positively forecast disaster responsiveness. These results propose that poor performance of procurement activity will decrease disaster responsiveness significantly by 26.9 %.

When the performance of procurement activity decreases it will decrease disaster responsiveness. Procurement significantly and positively affects disaster responsiveness in International Medical Corps South Wollo Zone Branch.

To express the dependent variable (disaster responsiveness) and independent variable (Transportation, Warehousing and Procurement in mathematical equation,

Let: $Y = \text{Disaster Responsiveness};$

$X_1 = \text{Transportation},$

$X_2 = \text{Warehousing},$

$X_3 = \text{Procurement},$

Therefore, the general relationship is written mathematically as follow:

$$Y = (0.443x_1 + 0.502x_2 + 0.296x_3)$$

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary

The objective of the study was to assess the effect of logistics practices on disaster responsiveness in south wollo Zone International Medical Corps. Hence, the design of the study was descriptive and explanatory research design. In International Medical Corps there are 1200 employees therefore, all the employees of International Medical corps are the study populations or target population of the study. Sample size was fixed to International Medical corps South wollo zone branch 300 employees as respondents selected by using simple random sampling technique. The data gathering tool was questionnaire and analyzed using descriptive and inferential statics. This study was guided by the following research hypothesis:

H1: Transportation has positive effect on disaster responsiveness in south wollo Zone International Medical Corps.

H1: Warehousing has positive effect on disaster responsiveness in south wollo Zone International Medical Corps.

H1: Procurement practices has positive effect on disaster responsiveness in south wollo Zone International Medical Corps.

The first research hypothesis was about the effect of transportation on disaster responsiveness. After the researcher had administered six questions to the respondents, the following results were obtained. The respondents thought that the employee of International Medical Corps has no transportation access to reach in duty location on time, there is no service provided by the organization for work purposes in disaster relief activities, there is transportation delay in providing humanitarian needs to relief disaster, the status of vehicles are not good to transport humanitarian materials to affected communities and they thought that the status of transport infrastructure poor for disaster relief activities. Besides, the regression result depicts that $B = 0.443$ $P = 0.000$ ($p < 0.001$). As a result, the hypothesis is accepted and the null hypothesis is rejected.

The second research hypothesis was about the warehousing status of International Medical Corps. After the researcher had administered five questions to the respondents on the warehousing condition of the organization, the researcher got the following results. The respondents thought that the warehouse structure of south wollo zone IMC is not well organized, the stock handling is not suitable for responsive disaster relief activities, emergency kits are not available in the warehouse, it is not well accessible for

disaster relief activities and it is not well secured. Furthermore, the regression result shows that $B = 0.502$ $P = 0.000$ ($p < 0.001$). Therefore, we can reject the null hypothesis and accept the hypothesis.

The third research hypothesis was about procurement practice of International Medical Corps. After the researcher had administered five questions to the respondents on procurement activities, he got the following results. The respondents thought that their organization has a poor procurement system and place, the procured materials or services most of the times are not up to the quality standards of the requestor, the procured materials or services are not up to the quantity requirements of the requestor, there is no transparency between program or requestor staff with procurement staff and all the materials or service procured have not been produced with the organization code of conduct and ethical standards. In addition, the regression result portrays that $B = 0.269$ $P = 0.000$ ($p < 0.001$). Thus, the hypothesis accepted and the null hypothesis is rejected.

5.2 Conclusion

The findings of the study indicated that the transportation of International medical corps show that the employees has no transportation access to reach in duty location on time, there is no service provided by the organization for work purposes in disaster relief activities, there is transportation delay in providing humanitarian needs to relief disaster, the status of vehicles are not good to transport humanitarian materials to affected communities and they thought that the status of transport infrastructure poor for disaster relief activities and it is on affecting the organization responsive disaster activities. Besides, the regression result depicts that $B = 0.443$ $P = 0.000$ ($p < 0.001$). As a result, we can accept the hypothesis and reject the null hypothesis.

The respondent's thoughts that the warehousing condition of International Medical Corps show that the warehouse structure of south wollo zone IMC is not well organized, the stock handling is not suitable for responsive disaster relief activities, emergency kits are not available in the warehouse, it is not well accessible for disaster relief activities and it is not well secured as a result it is found in a poor status and on affecting the organization responsive disaster activities. Furthermore, the regression result shows that $B = 0.502$ $P = 0.000$ ($p < 0.001$). As a result, we can accept the hypothesis and reject the null hypothesis.

The respondents thought that procurement practices has a poor procurement system and place, the procured materials or services most of the times are not up to the quality standards of the requestor, the procured materials or services are not up to the quantity requirements of the requestor, there is no transparency between program or requestor staff with procurement staff and all the materials or service procured have not been produced with the organization code of conduct and ethical standards as a result it is on affecting the organization responsive disaster activity. In addition, the regression result portrays that $B = 0.269$ $P = 0.000$ ($p < 0.001$). As a result, we can accept the hypothesis and reject the null hypothesis.

5.3 Recommendations

Based on the conclusion given above, the following recommendations were made to be addressed to the stakeholders:

- In terms of transportation infrastructure, it is recommended that the organizations expected to boost their supporting activities in the areas of transport in order to avoid any hindrance and needs in disaster responsiveness activities. The organizations also needs to make sure that the transport company they engaged with should be a Level 1 Freight Company that basically got that rank due to a good performance of a truck, as engaging with bad truck will delay the delivery and become specific challenges for effectiveness of a logistics performance. In this regards, market assessment is needed as well to get a potential transporters in Ethiopia, in addition having a long term agreements with potential transport companies will sustain the logistics performance. In other hands appropriate budgets also needs to be allocated in the organizations to expedite relevant logistical arrangements on time.
- The warehouse infrastructure, is a key structure that should be improved dramatically, there should be of proper protections, warehouse management, stock handling and other related activities expected to be improved. As far as storage and warehousing performance concerned, the researcher recommends that concerned manager's needs to consider a rub halls options which can be used as a mobile storages in any areas. Keeping sufficient rub halls on stock could help them to make their warehousing needs more flexible and effective. Scarcity of warehouse space will affect the possibility of stocking relief aid for prepositioning purpose therefore the management needs to ensure that sufficient warehouse spaces are always in place.

In addition, the top management needs to review their warehouse capacity and information management system in order to act on improvement areas. Regarding workload and staff size aspect the management needs to evaluate their logistics staff size to avoid stress and unnecessary workloads. Therefore the management will have a chance to hire more employees to expedite the day to day emergency related requests.
- Furthermore the researcher suggested that management of the organization to regularly review their procurement policy, procedures and guidelines to cope with fluctuating global trends. Regarding the local transport performance it's recommended that logistics collaboration among different humanitarian organization is relevant in order to compile potential local transporters for future needs. humanitarian organizations also needs to engage qualified vendors through a long term agreement in

order to ensure the required transport can be sourced quickly at any given time.

- More studies in the area are still necessary in order to integrate both theoretical and practical solutions for the major issues presented. It is understood that an in-depth assessment, with an analysis of a greater number of humanitarian responses to natural disasters, will allow a more accurate view of these often missed opportunities and organizational solutions.

5.4. Further Research Direction

Since this study conducted only in South Wollo zone International Medical Corps, it might be possible that the findings may not reflect the problems of logistics activity on responsive disaster activity on other similar Humanitarian organizations. It is, therefore important that further study be carried out on other organizations in other localities in the humanitarian industry to establish whether similar scenarios exist. A study should also be carried out to establish whether poor performance of Humanitarian organization is in relation to poor logistics activity.

References

- Alexander, D., (2003). Towards the development of standards in emergency management training and education. *Disaster Prevention and Management*,
- Altay N, Green III WG (2006). OR/MS research in disaster operations management.
- Apta, A., (2009). Humanitarian logistics: A new field of research and action. *Foundations and Trends® in Technology, Information and Operations Management*,
- Balcik B, Beamon BM, Smilowitz K. (2008). Last mile distribution in humanitarian relief. *J Intell Transp Syst*;12:51e63.
- Balcik B, Beamon BM, Krejci CC, Muramatsu KM, Ramirez M. (2010). Coordination in humanitarian relief chains: practices, challenges and opportunities. *Int J Prod Econ*;126:22e34.
- Baker, P., Canessa, M. (2009), “Warehouse design: A structured approach”, *European Journal of Operational Research*, Vol. 193,
- Barbaroso_glu G, Özdamar L, Çevik A (2002). An interactive approach for hierarchical analysis of helicopter logistics in disaster relief operations.
- Baumgarten, H. (2011). “Humanitäre Logistik”. In: *Humanitäre Logistik: Herausforderungen und Potenziale der Logistik in der humanitären Hilfe*. Ed. by H. Baumgarten, J. R. Schwarz, and M. Kesler. Hamburg: DVV Media Group.
- Beamon, B.M. & Balcik, B., (2005). Distribution network design for humanitarian relief chains, IE Graduate Seminar,
- Biggam (2008). *Succeeding with your masters dissertation: a step by step hand box*: New York 3rd ed..
- Biswas, B.C. & Choudhuri, S.K., (2012). Digital information resources for disaster management of libraries and information centres. *Bangladesh Journal of Library Information Science*,
- Balcik, B., Beamon, B. M. (2008). Facility location in humanitarian relief. *International Journal of Logistics-research and Applications*,
- Campbell AM. (2008). Routing under relief efforts. *TranspSci*;42:127e45.
- Chakravarty, A. K. (2014). “Humanitarian relief chain: Rapid response under uncertainty”. In: *International Journal of Production Economics* 151.146-157,
- Chan, F. T. S., Chan, H. K. (2011), “Improving the productivity of order picking of a manual-pick and multi-level rack distribution warehouse through the implementation of class-based storage”,
- Chern CC, Chen YL, Kung LC. (2009). A heuristic relief transportation planning algorithm for

- emergency supply chain management. *Int J Comput Mathem*;1e27.
- Chiappetta Jabbour, C. J., V. Amorim Sobreiro, A. B. L. de Sousa Jabbour, L. M.de Souza Campos, E. Barberio Mariano, and D. W. Scott Renwick (2019). “Ananalysis of the literature on humanitarian logistics and supply chain management:Paving the way for future studies”. In: *Annals of Operations Research* 283,.
- Creswell, J. W. (2005). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (2nd Ed.). Upper Saddle River, NJ: Pearson Education.
- Creswell, J. W. (2014). *Research Design: Qualitative, Quantitative and Mixed Methods Approaches* (4th ed.). Thousand Oaks, CA: Sage.
- Daud, M.S.M.,(2016). Humanitarian logistics and its challenges: The literature review. *International Journal of Supply Chain Management*,
- Falasca, M. & Zobel, C. W. (2011). A two-stage procurement model for humanitarian relief supply chains. *Journal of Humanitarian Logistics and Supply Chain Management*,
- Fekadu, M. (2013). *Logistics Practices in Ethiopia*, Swedish university of agriculturalsciences (SUAS).
- Gözaydın, O. and Can, T. (2013). Selection for Logistics Center of Earthquake Aid Stations: The Case of Turkey. *Journal of Aeronautics and Space Technologies / Aeronautics and Space Technology Magazine*,
- Gu, J. et al. (2010), “Research on warehouse design and performance evaluation: A comprehensive review”, *European Journal of Operational Research*, Vol. 203,
- Haghani A, Oh S-C (2016). Formulation and solution of a multi-commodity, multimodal network flow model for disaster relief operations.
- Hallikas, J., Karvonen, I., (2004). Pulkkinen, U., Virolainen, V.-M. & Tuominen, M., Risk management processes in supplier networks. *International Journal of Production Economics*,
- Hein, C. (2019). “Systematization of humanitarian NGOs from a logistical viewpoint:An exploratory study in Germany”. In: *Logistics Management, Proceedings of theGerman Academic Association for Business Research*. Halle, pp. 221–237.
- Hein, C., N. Eichhorn, and Lasch (2020b). “Case study research in humanitarian logistics: Challenges and recommendations for action”. In: *Smart and sustainable supplychain and logistics: Trends, challenges, methods and best practices*. Ed. by P. GolinskaDawson, K. Tsai, and M. Kosacka-Olejnik. Cham: Springer,
- Helfferrich, C. (2011). *Die Qualit`at qualitativer Daten: Manual f`ur die Durchf`uhrung*.

4th edn. Wiesbaden: VS Verlag.

- Iyer, G.V. & Mastorakis, N.E., (2006). Important elements of disaster management and mitigation and design and development of a software tool. Proceedings of the 7th WSEAS International Conference on Mathematics and Computers in Business and Economics, Cavtat, Croatia,
- Jiang, Y. & Yuan, Y., (2019). Emergency logistics in a large-scale disaster context: Achievements and challenges. International Journal of Environmental Research and Public Health,
- Jotshi A, Gong Q, Batta R. (2009). Dispatching and routing of emergency vehicles in disaster mitigation using data fusion. Socio-Econom Plan Sci;43:1e24
- Khan, K. et al. (2001), Undertaking Systematic Reviews of Research on Effectiveness: CRD's Guidance for those Carrying Out or Commissioning Reviews, NHS Centre for Reviews and Dissemination, University of York, York, UK.
- Khan, P.H., (2008). Disaster management cycle: A theoretical approach. Management and Marketing Journal,
- Koster, R. et al. (2007), "Design and Control of Warehouse Order Picking: A Literature Review", European Journal of Operational Research, Vol. 182, No. 2,
- Kovács, G. and K. M. Spens (2007). "Humanitarian logistics in disaster relief operations". In: International Journal of Physical Distribution & Logistics Management 37.2,
- Kovács, G. & Spens, K.M., (2010). Knowledge sharing in relief supply chains. International Journal of Networking and Virtual Organisations,
- Kunz, N., and Reiner, G. (2012). A Meta-Analysis of Humanitarian Logistics Research. Journal of Humanitarian Logistics and Supply Chain Management..
- Leiras, A., I. de Brito, E. Queiroz Peres, T. Rejane Bertazzo, H. Tsugunobu, and Y. Yoshizaki (2014). "Literature review of humanitarian logistics research: Trends and challenges". In: Journal of Humanitarian Logistics and Supply Chain Management.
- Lerher, T. et al. (2010), "Travel time models for automated warehouses with aisle transferring storage and retrieval machine", European Journal of Operational Research, Vol. 205,
- Lodree Jr., E.J. & Taskin, S., (2008). An insurance risk management framework for disaster relief and supply chain disruption inventory planning. Journal of the Operational Research Society,
- Long, D.C. & Wood, D. F. (1995). The logistics of famine relief. Journal of Business Logistics,
- Nikbakhsh, E. & Farahani, R. Z. (2011). *Logistics Operations and Management*. London: Elsevier.

- Oxford, R. (1990). *Language Learning Strategies: What Every Teacher Should Know*. New York: Newbury House Publishers.
- Özdamar L, Ekinçi E, Küçük yazıcı B. (2004). Emergency logistics planning in natural disasters. *Ann Oper Res*;129:217e45.
- PAHO (2001). *Humanitarian Supply Management in Logistics in the Health Sector*. Washington: Pan American Health Organization.
- Panayides, P. M. (2007). The impact of organizational learning on relationship orientation, logistics service effectiveness and performance. *Industrial marketing management*, 36(1),
- Rouwenhorst, B. et al. (2010), “Warehouse Design and Control: Framework and Literature Review”, *European Journal of Operational Research*, Vol. 122,
- Şen and Esmer (2017). Afet Lojistiği: Bir Literatür Taraması [https:// www. researchgate. Net /project/afet-lojistigi-bir-literatur-Taramasi](https://www.researchgate.net/project/afet-lojistigi-bir-literatur-Taramasi)
- Sheu J-B. (2007). An emergency logistics distribution approach for quick response to urgent relief demand in disasters.
- Sowinski, L. L. (2003). The lean, mean supply chain and its human counterpart. *World Trade*,
- Taupiac, C. (2001). Humanitarian and development procurement: a vast and growing market. *International Trade Forum*,
- Thomas, A. (2003). Why logistics?. *Forced Migration Review*.
- Thomas, Anisya S. And Laura R. Kopczak; (2005). *From Logistics to Supply Chain Management: The Path Forward in the Humanitarian Sector*. Fritz Institute. <http://www.fritzinstitute.org/PDFs/WhitePaper/FromLogisticsto>.
- Tomasini, R.M. & van Wassenhove, L.N., (2009). *Humanitarian Logistics*, Houndmills: Basingstoke and Palgrave Macmillan: New York, NY,
- Tseng, T. Y. et al. (2008), “How to use a systematic literature review and meta-analysis”, *The Journal of Urology*, Vol. 180, No. 4,
- Tzeng G-H, Cheng H-J, Huang TD. (2007). Multi-objective optimal planning for designing relief delivery systems. *Transp Res E*;43:673e86.
- UNISDR, (2020). Relief Web, terminology on disaster risk reduction: World. [https:// relief web. Int /report/ world /2009-unisdr-terminology-disaster-risk-reduction](https://reliefweb.int/report/world/2009-unisdr-terminology-disaster-risk-reduction).
- UN-SPIDER (2020). Knowledge Portal, Risks and disasters. www.un-spider.org/risks-and-disasters. Accessed on: 10 Mar..
- Van den Berg, J. P. (1999), “A Literature Survey on Planning and control of Warehouse Systems”, *IIE Transactions*, Vol. 31, No. 8,

- van Wassenhove, L.N.,(2006). Humanitarian aid logistics: Supply chain management in high gear.
Journal of the Operational Research Society.
- Vrijhoef, R., Koskela, L. (2000), “The four roles of supply chain management in construction”, European
Journal of Purchasing & Supply Management, Vol. 6,
- Yi W, Özdamar L. (2007). A dynamic logistics coordination model for evacuation and support in
disaster response activities. Eur J Oper Res;179:1177e93.
- Yi W, Kumar A. (2007). Ant colony optimization for disaster relief operations. Transp Res
E;43:660e72.
- Zanjirani Farahani, R., Rezapour, S. & Kardar, L., (2011). Logistics Operations and
Management Concepts and Models, Elsevier: London,.

Appendix A

Questionnaire to be filled by employees of International Medical Corps



**ADDIS ABABA UNIVERSITY
SCHOOL OF COMMERCE
DEPARTMENT OF LOGISTICS AND SUPPLY CHAIN
MANAGEMENT**

Dear respondents!!

I am a graduate student of Logistics at Addis Abeba University. I am currently conducting a research study on "the effect of logistics activity on disaster responsiveness in the case of South Wollo Zone International Medical Corps.

The objective of this study is to determine how Logistics Activity influences disaster responsiveness of South Wollo Zone International Medical Corps. The information that you will give me is very decisive for the success of this study. Therefore, I would be very delighted if you could possibly fill in the questionnaires correctly and honestly. I would like to assure you that the information that you will give me is used for this study only and kept confidential ever and ever.

Sincerely,

Please note that you don't have to write your name.

Write your responses using a thick mark

Thank you for scarifying your precious time in advance!

PART I: Demographic Information

- | | | | | | |
|---------------------------|---------------|--------------------------|----------------|--------------------------|---------------------------------------|
| 1. Sex | Male | ☐ | Female | ☐ | |
| 2. Age | 20 -25 | ☐ | 31 – 35 | ☐ | 41 and above ☐ |
| | 26 – 30 | ☐ | 36 – 40 | ☐ | |
| 3. Educational background | | | | | |
| | Grades 1 – 4 | ☐ | Grades 5 – 8 | ☐ | |
| | Grades 9 – 10 | ☐ | Grades 11 – 12 | ☐ | |

Certificate ☐ Diploma ☐

First Degree and Above ☐

4. Marital Status Single ☐ Married ☐ Divorced ☐ Widowed ☐

5. Years stayed at the organization

Less than 2 Years 6-10 years ☐ ☐

2-5 years Over 10 Years ☐ ☐

6. Your department/Work unit _____

PART II: Influence of Logistics Activity in Disaster Responsiveness.

Express your agreement using the following rating scales the effect of transportation, warehousing and procurement in disaster response, please tick the appropriate number to indicate the extent to which you agree or disagree with each statement. The item scales are five-point rating Scale with 1 = Strongly Disagree, 2 = Disagree, 3 = Undecided, 4 = Agree, & 5 = Strongly Agree

Part -1 Transportation		Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
1	In your organization employee has transportation access to reach in duty location on time.					
2	In your organization there is a service provided by an organization for work purposes in disaster response activities.					
3	In your organization evaluation and monitoring of the organization transportation system has been done at least once per month.					
4	In your organization there is no transportation delay in providing humanitarian needs to relief disaster.					
5	In your organization the statuses of vehicles are good to transport humanitarian materials to affected communities in disaster responsiveness					
6	In your organization transport infrastructure has conducive status for the activities of Disaster responsiveness					
Part – 2 Warehousing						
1	In your organization south wollo zone IMC the warehouse structure is well organized					

2	In your organization south wollo zone IMC the stock handling of is suitable for disaster relief activities					
3	In your organization south wollo zone IMC emergency kits are available in the warehouse of					
4	In your organization south wollo zone the warehouse is accessible for disaster relief activities					
5	In your organization south wollo zone IMC the warehouse is well secured					
Part – 3 Procurement						
1	You feel that your organization has a proper procurement system and place					
2	You believe the procured materials or services most of the times are up to the quality standards of the requestor.					
3	You believe the procured materials or services most of the times are up to the quantity requirements of the requestor.					
4	In your organization, there is transparency between program or requestor staff with procurement staff					
5	In your Organization that all the materials or service procured have been produced with the organization code of conduct and ethics standard					
Part – 3 Disaster Responsiveness						
1	In your organization disaster relief items are well organized and the employees are ready to give effective disaster response					
2	In your organization emergency disaster relief response giving team are organized to give responsive disaster relief in times of emergency disaster					

3	In your organization the logistics staff is ready to give effective response to disasters since it have been emerged in region.					
4	In your organization there is a quantified out puts in responsive disaster logistics activities					
5	In your organization the transportation infrastructure, warehousing infrastructure and procurement practices are well organized and coordinated to give responsive disaster relief.					

Appendix B

Correlations

Correlations					
		Transport	Warehouse	Procurement	Disaster Responsiveness
Disaster Responsiveness	Pearson Correlation	.860 ^{**}	.879 ^{**}	.208 ^{**}	1
	Sig. (2-tailed)	.000	.000	.000	
	N	300	300	300	300
**. Correlation is significant at the 0.01 level (2-tailed).					

Regression

Variables Entered/Removed^a

Model	Variables Entered	Variables Removed	Method
1	Procurement, Warehouse, Transport ^b	.	Enter

a. Dependent Variable: Disaster Responsiveness

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.938 ^a	.879	.878	1.31484

a. Predictors: (Constant), Procurement, Warehouse, Transport

ANOVA^a

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	3718.863	3	1239.621	717.044	.000 ^b
	Residual	511.723	296	1.729		
	Total	4230.587	299			

a. Dependent Variable: Disaster Responsiveness

b. Predictors: (Constant), Procurement, Warehouse, Transport

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.044	.252		-.175	.861
	Transport	.386	.037	.443	10.492	.000
	Warehouse	.438	.037	.502	11.929	.000
	Procurement	.168	.013	.269	13.229	.000

a. Dependent Variable: Disaster Responsiveness