ASSESSMENT OF HUMANITARIAN LOGISTICS COORDINATION PRACTICE, ROLES AND PERFORMANCE

THE CASE OF ERCS

BY

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Declaration

This research project is my original work and has not been submitted for examination to any other university.

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Statement of certification

This investigation, entitled *"ASSESSMENT OF HUMANITARIAN LOGISTICS COORDINATION PRACTICE, ROLES AND PERFORMANCE- the case of ERCS"* was carried by **WASIHUN TAYE LEGESE** so as to obtain his second degree from Addis Ababa University School of Commerce. He conducted his original thesis under my guidance and supervision. I certify that, the study is his own original work and suitable for submission of the award of MA in Logistics and supply chain Management.

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Dedication

To ERCS (Ethiopian Red Cross Society) for allowing me conduct the research and all the facilitation owed in this regard. Above all, I dedicate this piece of research work to the humanitarian workers who have given their life and everything in advancing services to the humanitarian work.

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Contents

Acronyms

SCM	Supply Chain Management
HO	Humanitarian Organizations
HL	Humanitarian Logistics
HRSC	Humanitarian Relief Supply Chain
SCC	Supply Chain Coordinators
HSCM	Humanitarian Supply Chain Management
HCC	Humanitarian Community Coordination
LHA	Local Humanitarian Actor
CHA	Humanitarian Coordinator Actor
HROs	Humanitarian Relief Organizations
IRC	International Rescue Committee
ERCS	Ethiopian Red Cross Society
IFRC	International Federation of Red Cross
WFP	World Food program
UNDP	United Nation’s Development Program
ESLSE	Ethiopian Shipping and Logistics Services Enterprise

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Abstract

As a result of the dramatic increase in natural and man-made disaster losses, humanitarian practitioners and academicians are seeking effective and efficient means of minimizing the tremendous losses. Although various theoretical underpinnings are beneficial to understand the importance of supply chain in a humanitarian context, the management of logistics coordination mechanism along the humanitarian supply chain has yet to be explored. This study seeks to examine the antecedents and outcomes of coordination in logistics management to mitigate the coordination challenges and enhance humanitarian logistics performance. In particular, the factors (resource sharing, information sharing and organizational relationship) are identified to evaluate their causal relationship of coordination mechanism initiatives that are presumed to influence humanitarian logistics performance concerting the moderating role of relief environmental uncertainty. Drawing on social network theory, the resource based theory and relief coordination theory, a conceptual model was developed and tested using 56 respondents working in ERCS. Based on the research finding it was recommended that ERCS to consider: mechanisms of assurance of funding by implementing partnership preconditions with donors and other stakeholders, increase the amount exchange of information with partners, improved specialization in HL management and cross-cutting tasks and forge long term collaboration and partnership with other actors to enhance performance of logistics coordination. In addition ERCS needs to establish appropriate policy, procedures and mechanisms to facilitate logistical coordination by forming strategic relationship with other actors, align logistics capability and devise ways to ensure sufficiency of donors funding for logistics infrastructure, capabilities and long term disaster preparedness. It is also stipulated that ERCS design improved standardization of operations and common guidelines and/or service requirements, invest in logistics expertise and knowledge management practice by employing continuous improvement mechanisms towards logistics coordination optimization and enhanced HL performance.

Key word: humanitarian logistics, humanitarian logistics coordination, humanitarian logistics performance.

CHAPTER ONE

INTRODUCTION

The background of the study and problem statement as to why humanitarian logistics coordination practice and its performance is required is discussed followed by outline of research questions and objectives of the study. In addition, significance of the study and scope are also included along with some limitations and organization of the thesis.

1.1 Background of the study

Fritz institute explain that logistics is central to disaster relief for several reasons. First, it serves as a bridge between disaster preparedness and response, between procurement and distribution, and between headquarters and the field. Second, it is crucial to the effectiveness and speed of response for major humanitarian programs, such as health, food, shelter, water and sanitation. It can be one of the most expensive parts of a relief effort. Third, since the logistics department handles tracking of goods through the supply chain, it is often the repository of data that can be analyzed to provide post-event learning. Logistics data reflects all aspects of execution, from the effectiveness of suppliers and transportation providers, to the cost and timeliness of response, to the appropriateness of donated goods and the management of information.

More lives could be saved, and great degree of suffering could be reduced by the efficiency and effectiveness of humanitarian aid delivery in response to disasters. It is achieved through humanitarian supply chain management as 80% of disaster relief efforts are governed by logistics. There are four proposed humanitarian supply chain performance constructs, namely beneficiary perspective, financial perspective, internal process perspective and learning and growth Perspective (Sivadass, *et.al*, 2018: p3).

Peter, *et.al*. (2015: p1) describes in citing to Gazley and Brudney (2007), coordination can yield many benefits such as economic efficiencies, greater service quality, organizational learning, access to new skills, diffusion of risk, improved public accountability, ability to buffer external uncertainties, and conflict avoidance. The significant amount of uncertainty such as number of

beneficiaries, availability of supply, conditions of supply networks, availability of human resources faced by HOs when responding to disasters can be leveraged by coordination.

Achieving optimal logistics performance requires comprehensive and mutual relationships between stakeholders in an integrated manner, to coordinate processes efficiently and effectively, eliminating redundancies and maximizing efficiency through its participants. Logistics' usually focused in the object and its travel time, path and destination, while the management of supply chains focuses on the relationships between the actors involved and both are crucial responses linked to disasters (Leonardo &Mirian**,**2011: p2).

Effective disaster risk management system requires strong relationship and collaboration with relevant sub-regional, regional and global organizations and states. The cooperation should concentrate in particular on establishing strong working relationship around capacity building and response activities in addition to facilitating conditions for regular exchange of information required for undertaking multi-hazard disaster risk monitoring and providing timely and comprehensive response (FDRE,2013: p8).

Tilahun and Mekonnen (2016: p927-932) identified the key challenges related to the operations of multimodal transportation system are poor network connectivity, the problem of ICT usage at each level, the lack of railway infrastructure, lack of competition in the multimodal transport system, the distance between origin or source materials and customers to get on time, poor coordination, lack of integrity with Stakeholder relationship, shortage of trucks by ESLSE, length of procedures and the involvement of different stakeholders, shortage of skilled human power, resistance from the Djibouti, and employment issues, were identified as serious challenges.

The increasing number and complexity of disasters has made specialization and coordination both important and challenging. Coordination proved difficult in such large and complicated settings. Some provision of relief was overlapping, some populations were not well served and there were problems related to prioritizing the pipeline. Such cases indicate the need for coordination in terms of both preparedness and response, such as contingency planning, needs assessment, appeals, transport management and last-mile distribution. An important question is when and how the key players should collaborate and how they should be coordinated (Marianne& Leif-Magnus, 2010: p3).

1.2 Background of target organization

The Ethiopian Red Cross Society (ERCS) was established by government decree on 8 July 1935 in the aftermath of the second Italian aggression over Ethiopia. ERCS began by providing humanitarian services to wounded soldiers and civilian victims. That same year on the 25 September 1935, ERCS was officially recognized as the 48th member of the International Federation of Red Cross and Red Crescent Societies. ERCS is auxiliary to the government and yet it is an independent humanitarian organization. It was established and recognized by law through a National Charter adopted in 31 October 1947. The Charter has undergone various parliamentary revisions, the last being in 1999. The current Charter was endorsed by the Parliament in January 2018.

The Ethiopian Red Cross Society has developed several long-term partnerships with partners from a wide range of backgrounds, including public bodies, other national societies, associations, including businesses, private initiatives and individuals. The Ethiopian Red Cross Society (ERCS) humanitarian diplomacy and communication department work to build the National Society image by raising the knowledge and awareness of the general public on its humanitarian activities for better access, improved knowledge and positive image. The department addresses the National Society strategic objectives to its local and international partners, Sister National Societies, GOs, NGOs, private organizations, volunteers and the public at large. The humanitarian diplomacy and communication department serves as the spokesperson for the National Society as far as external communication is concerned.

The resource mobilization department coordinates the mobilization of resources to enable ERCS to reach out the most vulnerable groups. It includes preparation of strategic documents, organization of fundraising events and facilitates capacity building programs. One of the oldest and well known Red Cross service by the community is the relief distributions for the people affected by the manmade and natural disaster. Since that the department was established and provides the relief actives based on the resources that mobilized from external sources. However this department change its name and activates based on the government policy and country contexts. In 2014 the department was separated in to two (Disaster preparedness and response (DPR) and disaster risk reduction (DRR)). So the newly established disaster preparedness and response department consisting of three coordinators: Emergency preparedness and response coordinator, emergency health coordinator and restoring family link coordinator.

1.3 Statement of the Problem

The lack of adequate infrastructure and poor basic services to the drought-prone areas of the horn of Africa cannot be overstated as key factors increasing disaster risk. The capacity of drought-prone areas to cope with hazards or build their livelihoods is fundamentally undermined by a severe lack of roads, electrification, communication, and basic and financial services (Catherine and Alexandra, 2013: p4).

Ethiopia is one of the fastest growing economies in the world, but it's growing from an extremely low level. However, huge population groups remain extremely vulnerable to unforeseen weather changes and other shocks affecting the harvests and thereby the availability of food. In fact, for Ethiopia's most vulnerable, acute poverty has increased over the past decade. The country is regularly exposed to droughts, floods, insect infestations and epidemics. Between 1980 and 2010, yearly averages of 1.8 million people were affected by disasters (SIDA, 2016).

Ethiopian logistics system is characterized by poor logistics management system and lack of coordination of goods transport, low level of development of logistics infrastructure and inadequate fleets of freight vehicles in number and age, damage and quality deterioration of goods while handling, transporting and in storage. This coupled with lack of sea port resulted in poor linkage of producers (farmers) to the consumers (market) and non-competitiveness of Ethiopian goods on global market, which compromised livelihood of the people and economy of the country. Efficient and effective logistics system needs to be put in place to solve these socio-economic problems (Debela, 2013: p3).

Given the social, physical and cultural challenges facing the transportation of food aid in Ethiopia, one key way in which the WFP can reduce supply chain inefficiencies and bottlenecks in the process is to coordinate information flows with multiple partners. Implementing greater communication channels within the supply chain will allow the WFP to mitigate unexpected disruptions, diversify risks and increase the chain's flexibility to unavoidable environmental changes (Christina S.K**. &**Javed S., 2010, p45).

According to (IFRC, 2016) some areas of improvement were identified as the need to have clear communication and there is need for stronger community engagement and coordination with authorities and other humanitarian actors such that needs identified at the point of assessment that cannot be fulfilled by ERCS can be met when coordination with other partners is properly facilitated. There is also the need to have timely implementation of planned activities and reduce

time lapse between assessment and actual delivery of service. Due to challenges with recruitment of field staff, the activities have been exposed to late implementation.

Irina, *et.al.* (2011: p3) argue that there has been considerable effort and initiative in the facilitation of logistical coordination among NGOs and other agencies involved in humanitarian relief. While some efforts are more successful than others, there are still untapped benefits and need for improvement in coordination.

Several other coordination problems have been practically observed from the previous disasters that have resulted to poor responsiveness of humanitarian organizations across the phases of the particular disaster (e.g. Jahre& Jensen, 2010; Sheu, 2007). Therefore, it is crucial for the humanitarian organizations to understand the importance of coordination, its antecedents which are appropriate in order to build an effective coordination mechanism along the humanitarian supply chains (Balcik et al., 2010) (Amin M., 2015).

According to IRCS (2019) efforts will also be made to continue supporting field teams and organizations with effective tools to streamline data collection and information management – particularly on access constraints to facilitate real-time solutions to access challenges and advocacy also work to enhance civil military coordination capacity amongst partners.

According to IFRC (2016) challenges behind the delays in relief operations were noted in the logistics supply chain, procurement at scale, and requirements under the IFRC, as well as HR recruitment and filling surge needs in this sector. Additional attention to coordination, engagement and clarity in roles and responsibilities between programs and support services, and technical support from programs to this emergency response operation was noted for potential improvement. The review findings highlighted that organization prioritization of an operation as an emergency response with emergency procedures (HR, Logistics etc.) is critical for efficiency and effectiveness. It was noted that challenges related to logistics have hindered the delivery of the response according to intended implementation timeframes.

Thus, ERCS, as one of the leading humanitarian organizations in the country, entails effective and efficient logistics coordination towards humanitarian supply chain management. This review therefore will summarize the role, practice and performance of humanitarian logistics coordination and its support system along with the major challenges and factors that help in humanitarian supply chain management optimization in ERCS to help in improving its humanitarian operation in the country.

1.4 Research questions

- What does logistics coordination practice and performance looks like in ERCS HSCM?
- To what extent is logistics coordination and HL performance are related?
- What are the major challenges in humanitarian relief logistics coordination at ERCS?
- What are the success factors in humanitarian logistics coordination in ERCS?

1.5 Research objectives

1.5.1 General objectives

To assess humanitarian logistics coordination practice, roles and performance in humanitarian logistics performance of the organization.

1.5.2 Specific objectives

- To assess the practice of logistics coordination and performance in ERCS HSCM.
- To assess the relationship between HL coordination and HL performance in ERCS.
- To identify major challenges that affect logistics coordination in ERCS.
- To identify major success factors of humanitarian logistics coordination in ERCS.

1.6 Significance of the study

This study will be useful in creating a clear understanding of humanitarian logistics coordination and its support system in organization supply chain management where the logistics department will able to give better service to achieve organizational goal. The study develops a model to the quality of logistics coordination as logistics operation is a key to the success of any organization doing business in the most efficient and effective manner and its importance is very critical in humanitarian relief organizations. Furthermore the community will indirectly benefit from the implementation of the recommendation in this study. Since the study is aimed to determine the factors of antecedent on coordination mechanism initiatives, the results of the study benefit humanitarian community to have better understanding about the coordination mechanism during relief assistance in a disaster. Thus it creates awareness among similar organization working with humanitarian relief works in better coordination of logistics efforts and reaching out to save life and rehabilitation of community and infrastructure during crisis. It also enables other researchers to use it as an additional source for further investigation in the area. Additionally, availability of

limited resources during disaster relief makes humanitarian organizations to develop a strategic coordination plan efficiently while delivering the aid supply to the beneficiaries.

1.7 Scope of the study

This study will be conducted in ERCS program, therefore the results of the study cannot be fully accepted as being completely relevant and applicable to all humanitarian, governmental and private companies. The study sample size and sampling procedure is limited and the study particularly focuses on one international humanitarian organization. However some micro level of generalization for similar organization in the same service requirement might be possible (Krauth.*et.al,* 2005).

In terms of context, this research outlined some common logistics coordination variables from literature and strives to see the practice, role and performance of logistics activities and humanitarian supply chain management in ERCS. The study of humanitarian logistics coordination practice and performance including the support system in humanitarian supply chain management will be of great significance not only to those that benefit from such initiative but also to those that work within this supply chain and disaster management at large. The study will explore the challenges and critical factors in logistics coordination towards effective and efficient supply chain management, so that best practices could be identified and implemented to avoid delays in reliefs' distribution an avoid loss of lives. However, the researcher tries to address in this paper the practice, roles and performance of logistics coordination in light of organizational information sharing, organizational resource sharing and organizational relationship perspectives. In addition, humanitarian logistics and supply chain performance will be analyzed in relation to logistics coordination efforts.

In terms of geographic dispersion as ERCS operates in different parts of the country including remote areas where it is difficult to access concerned personnel the head office will be contacted to obtain information for the study. The research of this nature contributes to the field of disaster management supply chain by providing an analysis of current disaster relief logistics management in supply chain effectiveness and strengthens the capabilities of humanitarian agencies in the effective handling of supply chain system by recruiting competent personnel and technology.

1.8 Limitation of the study

In addition to observation, questionnaire was be used as the major instrument for collecting data where respondents might reply on the basis of their own perception and there is a level of subjectivity that is not acknowledged. Respondents' potential bias and subjectivity can also be considered as limitation since the data will be collected based on convenient source. It may be difficult to get recorded information about disasters as aid responses are temporary and performed in limited period.

Due to time constraint and other resource constraints, the data collection for the project was done through convenient method and sources. It may be difficult to easily access the target population due to the nature of their profession; humanitarian supply chain officials are always busy and may not be available most of the time. Thus further study shall be done by making comparison between similar organizations to fully understand this area of research.

Because different disaster types require different response mechanisms, specific activities are usually designed. Therefore some of the finding from the research may be situational or company specific and may not be generic.

1.9 Operational definition of terms

Humanitarian Logistics is the processes and systems involved in mobilizing people, resources, skills and knowledge to help vulnerable people affected by natural disasters and complex emergencies.

Humanitarian supply chain is the processes and systems involved in mobilizing people, resources, skills and knowledge to help vulnerable people affected by disaster.

Partnering: to work together across the value chain with the intent to maximize the benefit to their customers-and, as a result, also to their own bottom line.

Logistics capability is the ability of firms to create and deploy resources in order to provide satisfaction to their customers and thereby enhance service performance.

Coordination is an 'act of properly combining (i.e. relating, harmonizing, adjusting, and aligning) a number of objects (i.e. actions, objectives, decisions, information, knowledge, and funds) for the achievement of the chain goal'.

Resource utilization is to utilize the assets or resources efficiently so as to maximize customer service levels, minimize lead times, and optimize inventory levels.

1.10 Organization of the study

The study was organized into five chapters. The first chapter deals with introduction of the problem, background and its approach. The second chapter was concerned with presenting the review of the related literature that focus on performance indicator, logistics coordination and supply chain performance done by different scholars. The third chapter covered research methods of the study. The fourth chapter was concerned to explain the analysis of the data collected and interpretation. The fifth chapter brought to an end this study with summary, conclusion and recommendation.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

A number of factors are associated with logistics coordination and its support system in different contexts and situations where the nature of the relationship and effect on humanitarian supply chain is not well investigated and documented. Hence this review will summarize the major elements, practice and challenges in logistics coordination and support system performance in humanitarian supply chain management using theoretical and empirical literature.

2.1. Theoretical literature review

This study is based on the social network theory, the resource based theory and relief coordination theory. Social network theory which is also called the Network theory; network analysis (Scott, 2001) has nodes and links as independent construct and node size, density, link strength as dependent constructs. The power of social network theory stems from its difference from traditional sociological studies, which assume that it is the attributes of individual actors whether they are friendly or unfriendly, smart or dumb among others that matter. One of the defining elements of social network theory that differentiates it from other sociological sciences is the weight it gives to the relationships between the nodes, as opposed to the attributes of the nodes themselves. Social networks have also been used to examine how humanitarian organizations interact with each other, characterizing the many informal connections that link executives together as well as associations and connections between individual employees at different humanitarian organizations (Layton, 2006). These networks provide ways for humanitarian organizations to gather information, deter competition, and even coordinate in setting operational policies (Layton, 2006).

According to Eisenhardt and Martin (2000), resource-based theory holds that the firm can be considered as a bundle of resources that are heterogeneously distributed across it in this case, humanitarian organizations with enduring differences between them. This theory posits that a company must secure an efficient bundle and flow of the right type of resources from its operating environment to stay relevant and prop up its performance (Rungtusanatham, *et al.,*

2003). In this theory, resources refer to physical or tangible assets that include plants, equipment; as well as intangible assets such as knowledge, expertise, and other organizational assets.

According to Zacharia, Sanders, and Nix (2011), Research Based Theory (RBT) is critical to many firms due to its competency in logistics and that it can be expensive if a company opts to invest in it. This is because competency is a source of sustainable competitive advantage that humanitarian organizations can have over a period of time and whose realization is pegged on the practicability of taking advantage of the resources that a company has to achieve efficiency and effectiveness by utilizing even the resources it does not own.

Humanitarian organizations have therefore relied on outsourcing to gain access to other firm's valuable resources in the competitive market. With the growing need for such resources, humanitarian organizations searching and providing such services become reciprocally adapted towards one another and more value dependent. The theory thus suggests that coordination enables firms to be accessible to complementary resources and create much more competitive resource bundles, providing them with a competitive advantage (Zacharia, Sanders & Nix, 2011).

Relief coordination theory posits that it is possible to orchestrate the efforts of diverse organizations and the orderly and organized direction of activities ((Seybolt, 1997; McEntire, 1997). The humanitarianism and war Project offers a more specific and often cited definition of the concept as: managing information; mobilizing resources and assuring accountability; orchestrating a functional division of labour in the field; negotiating and maintaining a serviceable framework with host political authorities; and providing leadership (Minear, 2002).

Analysts and scholars also often suggest that coordination is important to improve service delivery effectiveness. Indeed, while effectiveness is rarely defined, it is most often given as the reason why achieving coordination among service providing agencies is important (Minear, 2002). An effort to reduce duplication, often framed as securing or improving organizational efficiency, is also frequently offered as a rationale for why humanitarian organizations should seek to coordinate their assistance operations (McEntire, 1997).

2.1.1 Supply chain players in humanitarian relief

The actors in a humanitarian supply chain include: Local Humanitarian Actor (LHA), Humanitarian Coordinator Actor (CHA), Transportation logistics provider, Warehousing logistics provider, Suppliers, Donors and beneficiaries. These actors are responsible for

interacting with other actors, raising funds from donors, collecting information regarding demand, suppliers and logistics providers and making decisions (Irina, *et.al*, 2011: p5).

Emebet (2016: p23) in her citation to Olorutoba.*et.al* (2009), describe that there are various players or actors in international emergency relief chain. The supply chain managers have to have a capacity of managing multiply relationship with these players to achieve the objective successfully. The main players or actors in emergency relief chain are: Governments and their donor agencies, international humanitarian organizations (NGOs)(delivery partner), multilateral/international organizations and their specialized agencies , vendors of food and non-food relief good, transportation, shipping, freight forwarding companies, and allied support services, governmental agencies of the aid-receiving country and corporate donors who give in kind or in cash as a part of their corporate social responsibility obligations; and the international media.

2.1.2 Humanitarian organization and their missions

This study adopts a simple core definition for the humanitarian relief from the literature as the primary goal of humanitarian action is to "protect human life where this is threatened on a wide scale" (Seybolt, 2009). Saving life of human is at the heart of the humanitarian agenda within humanitarian organizations (Seybolt, 2009). Essential humanitarian concerns are highlighted as freedom from acute suffering, basic human well-being. In addition to that, reducing the excessive level of human suffering is considered as the second goal of the humanitarians (Darcy et al., 2003).

Natural disasters, which include events such as earthquakes, floods, result in the temporary displacement of approximately five million people The humanitarian organizations receiving donations from this global community include entities operating under the United Nations umbrella such as the World Health Organization (WHO) and the United Nations High Commissioner for Refugees (UNHCR), international organizations such as the International Federation of Red Cross and Red Crescent Societies (IFRC), and global non-governmental organizations (NGOs) like CARE and World Vision, as well as regional and country-specific NGOs. Humanitarian organizations usually include logistic units which can have different functions depending on the organizations or even the disaster and can include: procurement, warehousing, fleet management, transportation (of both supplies and people), asset Management, building Management, security, and information technology (IT), radio communication etc.

Humanitarian logistics information system (HLIS) enhance needs assessments by ensuring the field staff know what supplies are available for beneficiaries, either in local warehouses, pre-positioned emergency stocks (Fuad.I. A, 2017:p18).

2.1.3 Humanitarian logistics coordination practices

Coordination has been broadly identified as being essential for successful commercial supply chain management (SCM), as a potential source of competitive advantage, and as a strategic design of decision between actors to enhance performance in respect of customer service and response time. Coordination is an 'act of properly combining (i.e. relating, harmonizing, adjusting, and aligning) a number of objects (i.e. actions, objectives, decisions, information, knowledge, and funds) for the achievement of the chain goal' (Amin M., *et.al*, 2018: p1).

Balcik*et al*. (2010) defines coordination in HRSCs as the relationship and interactions among different actors operating within the relief environment. They further argue that coordination in humanitarian relief supply chains may appear horizontal or vertical. Horizontal coordination refers to the extent to which an umbrella organization coordinates with their partners at the same level within the chain. NGOs prefer horizontal coordination. Vertical coordination refers to the traditional hierarchical command-control structure of linking with partners in the chain. Government organizations and armed forces normally follow vertical coordination (Fabiola, *et.al*, 2017).

According to the theory on coordination, one advantage of horizontal coordination is that it can achieve advantages of scale and individual clusters would be expected to achieve some aspects of this. However, one particular challenge for the cluster system is that effective coordination across different clusters can be crucial to serving the beneficiary. The main effect of vertical coordination in the literature is to synchronize different levels of a supply chain for overall efficiency and to improve customer service by making all participants focus on the final customers' needs. Effective vertical coordination depends on successfully merging the pipelines of many of the organizations in an operation, and on creating a strategic level for carrying out coordination between disasters; that is, preparing for a coordinated approach in operations (Jahre& Leif-Magnus, 2010: p18).

They also note that several important issues when dealing with coordination have been discussed, including the question of what to coordinate. It is essential to coordinate flows that are

of a physical, informational and financial nature. Coordinating processes and activities, actors and technologies and systems are all ways of achieving efficiency. This covers what types of issues can be coordinated, in a broad and general sense, and those that can be carried out vertically and/or horizontally. Finally, the coordination can be carried out at an operational, tactical or strategic level.

Humanitarian relief organizations have a common need for integrated information technology (IT) solutions that support procurement, distribution through a pipeline, tracking and tracing of goods and funds, flexible and robust reporting and connectivity in the field. Despite the complexity of humanitarian logistics, manual processes are still dominant and IT resources which could enhance information availability, reporting and learning, are often not effectively leveraged (Fritz institute, 2013: p11).

2.1.4 The role of HLs in disaster relief SCM

Logistics is defined by council of logistics management as the process of planning, implementing and controlling the efficient, effective flow and storage of goods, services and related information from point of origin to point of consumption for conforming to customer requirements. The integration of two or more logistics with in a network to create value, enhance efficiency and satisfy customers is called supply chain management (Debela, 2013: p9).

Humanitarian logistics has the opportunity to increase its contribution to disaster relief and to be recognized for that contribution by addressing the pain points. This can be done through initiatives in the areas of knowledge management, technology, measurement, community and voice. While moving relief items to disaster sites will continue to be an important role for logistics, providing timely information, mining that information to garner insight as to how to improve operations, and learning internally and with others must be the strategic focus. Establishing a community that shares and invests jointly in advancing the field can leverage each logistician efforts many-fold. It is through these two mechanisms of information and community that humanitarian logistics can find its voice and create its future, rather than limit itself to responding to the present (Fritz institute, 2013: p13).

Frans, N.A. (2016: P40-42) in citing to Van Wassenhove (2006) and other scholars, describe that humanitarian logistics include all the processes and systems involved in mobilizing people, resources, skills and knowledge to help vulnerable people affected by disaster. In addition,

humanitarian logistics also comprise a variety of other activities such as: preparedness, planning, procurement, transport, warehousing, tracking and tracing, as well as customs clearance (Thomas &Kopczak, 2005). Furthermore, it is widely acknowledged that humanitarian logistics is mostly concerned with the delivery and distribution of relief aids to disaster victims as well as in complex emergencies including war and conflict situation (Jahre, Jensen &Listou, 2009). Thomas (2003) concluded that logistics is central to disaster relief delivery and distribution for the following reasons: First, it serves as a bridging between several points namely: disaster preparedness and response, procurement and distribution as well as headquarters and the field. Second, it is vital to the success and speed of response of relief items such as medication, food, water, shelter and sanitation. Third, being the department that handles tracking of goods through the supply chain, it is regularly the source of data that is able to provide post-event learning. Thus, logistics can be the greatest expensive parts of a relief effort (Thomas, 2003).

He also explain that the effectiveness of the supply chain in handling relief distribution has become very important because in most cases the situation under which it operates are considered as clearly erratic, turbulent and requiring flexibility (Oloruntoba& Gray, 2006). Some other scholars also argued that the role of the supply chain are becoming inextricable important in humanitarian logistics; hence it has become imperative that the humanitarian relief organizations embrace new supply chain strategies, techniques and technology for improving their effectiveness in service operations in humanitarian logistics (Heaslip, 2015). In addition, Kovacs and Spens (2007) explained that within humanitarian logistics the greatest focus has shifted from providing core products and services to the effectiveness of its supply chain. This means that humanitarian organizations have to improve the effectiveness of their supply chains in getting the relief aids to the needy as early as possible.

Hence, scholars have agreed that it is only a great logistics service that can enable the quick, safe and reliable supply of goods and services to the needy as and when necessary. In support of this position Bölsche*et al* (2013) confirmed that, if the right goods (food, non-food items and medical items) are received by the right people (the most affected people) at the right time (as fast as possible) at the right place, in the right quantity and with the right quality (not poor quality goods), then the supply chain can be described as effective as it would have contributed to alleviating the suffering of vulnerable people.

2.1.5 Logistics challenges among humanitarian agencies

Frans, N.A. (2016: P56-59) in citation to various scholars such as Romano (2011) who states that, there are always senses of urgency to deliver relief supplies to the affected areas whenever emergency situations arise. There are different types of commodities that have to be delivered urgently to those affected such as medication, food, telecommunication and equipment (Borda, 2013). In addition to that, the greatest challenges to relief chain design and management include uncertainty and unpredictability of timing, location, type and size (Balcik&Beamon, 2008). There is also the problem of supply chain unpredictability that might be due to the suddenness of disasters and this can sometimes arouse the high risks associated with the delivery of goods and services on time (Kovacs &Tatham, 2009). Secondly, there might also be difficulties in arranging transports as quickly as necessary to move items from landlocked areas to disaster areas (Balcik&Beamon, 2008). Thirdly, the question of transparency in the distribution of aids might also arise. Fourthly, the security of humanitarian workers is also a huge challenge faced by supply chain managers. Lastly, there is the problem of lack of resources such as inadequate supply of food, technology, transportation capacity, money and volunteers (Balcik&Beamon, 2008).

Besides that, Sebbah, Boukhtouta and Ghanmi (2012) claimed that many organizations involved in the distribution of relief materials sometimes also encounter major scientific problems during emergency relief operations. Such problems might relate to automated identification of emergency supply, demand forecasting for basic commodities, transportation routing and monitoring as well as automated assistance to demand response (Sebbah*et al*., 2012).

He also states that the lack of a complete standardization of supply chain procedures has been identified as one of the major challenges in the handling of drought relief distribution (Kovacs &Spens, 2009). Nonetheless, the overall importance of humanitarian supply chain is emphasized by the participation of governments and many aid organizations in the system either as suppliers or as third party logistics providers (Kovacs &Spens, 2009). This point is further buttressed by the fact that there is a multitude of humanitarian agencies that are also involved with coordinating the efforts of various participants in every disaster crisis (Balcik&Beamon, 2008).

The authors proceeded to identify the crucial supply chain challenges in handling the distribution of relief materials as follows: unpredictability of disaster occurrence, suddenness of demand, high stakes associated with the timeliness of deliveries and lack of enough supplies, people, technology, transportation capacity, and funds. Kovacs and Spens (2009) categorized humanitarian support function following a disaster as: immediate response, plain relief, development relief and relief that require healing called rehabilitation. These support functions restore peoples' lives each day and improve the systems in place. Causes, effects and disaster scales vary and so do the organizations involved in overcoming the disaster shortfalls (Coleman, 2006). The relief assistance distributed by aid agencies poses particular challenges for the supply chain managers as the reduction of the impacts of these challenges had never been an easy task. Thus, Balcik and Beamon (2008) who reviewed the challenges faced in the supply chain of disaster relief distribution revealed that, these challenges depend on its nature and its area of occurrence. Kovacs and Spens (2009), however, classified the challenges into three types: challenges related to different types of disasters, challenges related to disaster relief phases, and challenges relating to different types of humanitarian firms.

In addition he describes that the causes of particular disasters frequently supply an understanding into the disaster logistics challenges. With poor knowledge of climate change effects, lack of standardized planning and preparedness processes, security and safety, different disasters will always prevail. The challenges related to disaster rescue phase are seen in terms of cycles linking recovery to preparedness (Pettit and Beresford, 2009). According to Kovacs and Spens (2009), the challenges differentiating humanitarian organizations take a variety of forms ranging from supranational aid organizations which are UN agencies, Red Cross Agencies and governmental organizations as well as non-governmental organization (NGOs). The organizations differ in presence, size and mandates to standard operating procedures and moreover, their sizes effectively limit operational potentials. For instance, small humanitarian organizations are known to focus on specified targets prevailing in a certain community or region (Coleman, 2006). The challenges faced by humanitarian organizations had been identified as follows: absence of collaboration among humanitarian organizations; unavailability of coordination among humanitarians; lack of knowledge among fellow players; humanitarian staffs are deprived of logistical training in carrying out emergencies; lack of supplies and funding among humanitarian agencies; and inadequate infrastructure creating extra logistical costs.

2.1.6 Humanitarian logistics performance measurement

Both, the private sector and the humanitarian sector, focus on the both logistical aims service and costs. For most humanitarian organizations a high logistic service has a higher priority than the logistics costs. With a good or even optimal logistic service the supply is quick, save and reliable. If the right goods (e.g. food and non-food items, medicine items) are received by the right people (the most affected people) at the right place, at the right time (as fast as possible) and with the right quality (e.g. food items or medicine is not of less quality because of extreme weather conditions) than humanitarian logistics can contribute to alleviate the suffering of vulnerable people. Often it even can save lives. The "right" logistic costs (e. g. for infrastructure, human resources, and food and non-food items) are part of the aims, as well. If humanitarian organizations lower the logistic costs they can use the budget for the core tasks of humanitarian aid. With this the aim for humanitarian logistics can be defined as maximizing logistic service under the restriction of a given logistic budget. Performance Measurement for humanitarian logisticians must be geared to these aims. It opens up possibilities to measure the target achievement and therefore performance measurement provides the necessary information for improvement (Bölsche, 2013: p5).

According to Beamon and Balcik (2008), the effective performance measurement systems can assist humanitarian relief supply chains in their decisions, to improve their efficiency and effectiveness, and increase the accountability and transparency of their response in disaster situations. Kovács and Spens (2007) define performance measurement as the process of quantifying the effectiveness and efficiency of an action. The system can be used as a basis to measure performance of humanitarian organizations in terms of response time, service quality, and technical and cost efficiency. According to (Giulia S. et al. 1998, pp.1-9) defined the performance measurement in an extended view: through four performances dimensions; responsiveness, flexibility, collaboration and cost performances and for each of them several key performances indicators (KPI) are stated: Responsiveness, Collaboration, Flexibility, Cost performance.

Hella and Matthias (2005: p12) propose to the performance of a supply chain depends on how its members coordinate their decisions and sharing information is the most basic form of coordination especially in the today's globalized environment. Humanitarian supply chain management performances measurement ensures that organizations get the right things to the

right places at the right time thereby creating time and place utility. Keebler and Plank (2009) categories the logistics performance measurement into effectiveness measures involving trading partner, effectiveness measures internal focus, efficiency measures, productivity and utilization (Mebrahtom, 2016: p24).

They indicate that supply chain performance measures can be classified into two categories: qualitative measures (such as customer satisfaction and product quality) and quantitative measures (such as order-to-delivery lead time, supply chain response time, flexibility, resource utilization, delivery performance, etc.). The quantitative performance measures are the most useful for supply chain development. Quantitative metrics of supply chain performance can be classified into two broad categories: nonfinancial and financial. Important quantitative metrics include: lead time, customer service level, inventory levels, resource utilization, and flexibility.

Measuring performance with a humanitarian focus is more than collecting indicators or metrics, such as the mentioned key performance indicators or logistics performance indicators. The definition above refers to a complex system which includes several organizations and actors. The necessity is given to consider connections and relationships across logistical processes and the whole supply chain. In addition performance management should not only focus on the end of the supply chain but also on former processes, because the performance of these processes influence the overall performance, as well (Bölsche, 2013: p11).

2.1.7 Humanitarian logistics coordination and HL performance

According to Jane (2013) the performance of a supply chain depends on how its members coordinate their decisions. Sharing information is the most basic form of coordination especially in the today's globalized environment. Increased globalization and competition has made SCM a very important and critical issue for any company if they have to deliver quality and timely services and products to their customers. SCM ensures that organizations get the right things to the right places at the right time thereby creating time and place utility (WatcharaveeChandraprakaikul, 1997). The SC performance characteristics with the greatest value in a supply chain are accuracy, responsiveness, cooperation, on time complete deliveries, reduction of inventory and mutual continuous improvement (Bonney, 2003).

As Frans N.A. (2016: P 37-40) puts the main goal of humanitarian logistics is to increase overall efficiency, to cut costs, to deliver with fewer errors, and to make the delivery at the right time so as to save more lives (Kovács&Spens 2007). At its most basic level, supply chain involves the

movement of goods or products from one point to another. For example there is a supply chain if a company makes its product from parts purchased from various suppliers, and those products are sold to its customers. Humanitarian logistics management is the aspect of the supply chain relating to the planning, implementing and controlling of the flow of humanitarian materials, goods and other resources from the source or point of origin to their final destination to meet the requirements of disaster victims who are the end-users. Those involved in humanitarian relief operation management are usually people with different culture, purposes, interests, mandates, capacity, and logistics expertise (Balcik et al., 2010).

He explains that humanitarian supply chains vary in intensity, because some of them are very simple while others are rather complicated. The complexity of distributing relief materials through the humanitarian supply chain varies with each disaster situation which in turn depends on the environment, the intricacies and numbers of items being moved to the desired location (Tomasini& Van Wassenhove, 2009). Most disaster prone countries have adopted humanitarian supply chain management processes and its associated technology in order to ensure that they are able to meet the demands of the victims timeously in order to satisfy their needs (Tomasini& Van Wassenhove, 2009).

Measuring performance can easily performed in commercial sectors since they use financial metrics which has clear and precise performance indicators (Beamon&Balcik, 2008).However in humanitarian sector the unpredictability of demand ,intangibility of service, Variety of interest ,standard of stakeholder and other factors makes measuring performance difficult. Therefore having logistics strategy to select high service quality for time and place utility makes the organization to minimize the effect of obstacles on logistics performance (Emebet, 2016: p25).

According to to Bölsche(2013), humanitarian organizations through sharing their resources including data and information of need assessment, experiences and feedback from past events, logistical infrastructure, and aid commodities can improve their performance in terms of cost of operations, responsiveness, and flexibility metrics. For most humanitarian organizations a high logistic service has a higher priority than the logistics costs. If humanitarian organizations lower the logistic costs they can use the budget for the core tasks of humanitarian aid.

According to Mimi S., *et.al. (*2016), due to the shortage of necessary resources and duplication of efforts, there is an emergent need to better coordinate efforts through resource sharing and

synchronization of processes among humanitarian organizations. Notwithstanding, poor responsiveness is reported between suppliers, UN agencies, and NGOs, which mostly stems from the lack of information sharing among the humanitarian organizations along their supply chains.

Organizational relationship is achieved through stable interactions and transparent relationships between the supply chain members and it entails, among other factors, common vision and objectives, as well as sharing of skills, ideas and carefully selected performance measures. When executed well, it can lead to significant performance improvements (Alfalla- Luque et al. 2013).

Donald (2003: p61**)** looks for the benefits of partnerships with its customers: Lower costs – due to better coordination, elimination of duplicated effort, less bureaucracy, quantity discounts, and economies of scale, shorter lead- times from improved coordination, procedures and administration, higher quality with uniform standards, collaboration in quality initiatives, less reliance on inspections and commitment to long term improvements.

According to Saichon P.(2016, p85) forging and maintaining long-term relationships is crucial in establishing stable links with partners and, in turn, enables and increases mutual trust between manufacturers and customers (Droge et al. 2004, Bagchi et al. 2005). These relationships are crucial in the process of logistics integration, as they ensure trust and cooperation, providing opportunities to improve work practices in the organizations involved, as well as reduce operational cost incurred by all partners (Kerdpitak&Heuer, 2013).

Furthermore improving the quality of teamwork with the aid of optimal logistics services along the supply chain and within cross-functional teams is based on the ability to encourage team building that allows for coordination and active cooperation between members of different departments and companies across the supply chain (Das et al. 2006).

2.1.8 HL roles and HL performance

According to Mingli Liu(2014) humanitarian aid and disaster relief supply chain management is described as "sense-and-respond", and includes a series of activities: planning, preparedness, procurement, transportation, warehousing, tracking, last mile delivery, and customer clearance (Thomas, 2007;Thomas and Kopczak, 2005).Thomas and Kopczak (2005) explain the process specifically: once a disaster happens, experts will be sent to assess the extent of damage and the number of affected people, helping identify both the kinds and the quantities of relief items required. Emergency stocks of standard relief items are sent from the nearest warehouses. When

the relief items arrive, local transportation, warehousing, and distribution need to be organized as part of this problem situation. However, few organizations have prioritized the development of high-performing supply chain operations for humanitarian aid and disaster relief. These operations are judged as being not as effective and efficient as they could be (Thomas and Kopczak, 2005). Thus, it is important to improve the performance of supply chain management and then enhance the whole humanitarian aid and disaster relief operations.

Performance measurement is critical to NGO accountability (Beamon, 2004). Lindenberg and Bryant (2001, p. 209) state: "As resources become tighter, NGOs face new pressures for greater accountability for program impact and quality. Today, contributors, donor agencies, scholars, and relief and development practitioners are all asking: do NGOs practice what they preach? How do we know? How effective are their programs and projects?" The increased frequency and scale of disasters, scarce resources, funding competition, and the need for accountability require more efficient, effective and transparent relief operations. Since logistics is central to relief operations and the most expensive part of any relief operation (Van Wassenhove, 2006), measuring the performance of relief chains has become vital for all organizations involved in disaster management (Endale, 2016: p2).

Balcik, et al. (2010) presented an overview of the coordination issues related to relief chains, and concluded that coordination is one of the critical aspects of the humanitarian supply chain that must be improved in order to increase its efficiency. Moshtari and Gonçalves (2011).Dolinskaya, Shi and Smilowitz (2011), identify that the large number and diversity of actors, urgency of a humanitarian relief response, and short period in which to establish coordination, limited information sharing and communication, allocation of costs, risk, and insufficient personnel dedicated to logistics coordination are the main challenges to improving the coordination among humanitarian stakeholders **(**Mark m.j., 2011: p1).

2.2 Empirical literature review

2.2.1 HL coordination practices in relief SCM

According to Catherine and Alexandra (2013: p14) response has been shown to be more timely and effective when provided locally (Zwaagstra*et al*. 2010). Communities have their own early warning systems and are very aware of the underlying causes of their vulnerability to drought, but they rarely receive long-term meteorological forecasts. When local authorities and

communities have been provided with the funds to implement disaster risk reduction plans and programs well before any drought episode, their capacity to cope with the situation has been enhanced.

They explain that coordination is essential during an emergency response and consequently several countries in East Africa have established government units or departments to lead humanitarian responses. For example, the Kenya Food Security Steering Group works across sectors and links the ministries into working sub-groups-Agriculture and Livestock, Health and Nutrition, Water and Sanitation, Education, and Disaster Management. The challenge is how these sub-groups coordinate activities both during and outside of drought to achieve jointly agreed outcomes.

Furthermore they note that the urgency of a crisis ensures sufficient political will exists among actors and between sectors to enforce the necessary coordination and cooperation required. Unfortunately in non-drought periods few countries have effective mechanisms to ensure that the necessary coordination in planning, policymaking and implementation takes place.

Effective disaster risk management system requires an efficient, dependable and technology supported information management and vertical and horizontal information exchange between different bodies involved in disaster risk management at all levels. When looking at the situation so far, however, in addition to the lack of dependable, uniform and technology supported information management system, the information exchange has been inefficient and not supported by technology (FDRE, 2013: p10).

Furthermore he describe that humanitarian supply chain management activities have three levels that are generally applicable in different parts of an organization: i) Operational which involves decisions that are made on day to day basis in organizations relating to how materials are moved along the supply chain. ii) Tactical: which involves middle range decisions affecting the movement of materials into the storage facilities and moving these materials to the affected communities. This generally involves creating strategies aimed at the reduction of storage costs and timely delivery of items to the affected community. iii) Strategic involving high level long term decisions pertaining to the involvement of the organization in its relationship to other stakeholders such as the government and its agencies.

In order to successfully implement the humanitarian supply chain management process, many countries now use the enterprise resource planning (ERP) which is integrated with a

transportation management system (TMS) which in turn drives the warehouse operation run by a warehouse management system (WMS). In order to optimize the benefits of the ERP, it has to be tied to the organization's financial system. Furthermore, the advent of the world-wide web has made instant communication between companies and their customers possible and this has also made the timely updating of information possible (Frans N.A., 2016).

2.2.2 Role of HL in relief SCM

Yadav and Barve concluded that there are 12 critical success factors of humanitarian supply chains, carved into seven levels based solely on their driving and dependence power. Government policies and Organizational Structure is the most significant critical success factor of humanitarian supply chain due to its location at the bottom position in the hierarchy. It is also clear that Coordination and Collaboration with other relief agencies directly influences the outcome of activities related to the donations management.

According to Rodney (2013) managing a humanitarian supply chain is not a simple task. Yadav and Barve (2015) sought to elucidate the critical success factors in the operation and management of these chains, resulting in an Interpretative Structural Modeling (ISM) and post a Matriced Impacts Croisés Multiplication Appliquée á unclassement(MICMAC) analysis to emphasize the dependence of forces and power relationships involved in such environment. They are: (1) Government policies and organizational structure; (2) Strategic planning for emergency relief supply system; (3) Robust information and communication technology; (4) Coordination and collaboration with other relief agencies; (5) Disaster resilient infrastructure and transport facilities; (6) Improved forecasting and early warning system; (7) Procurement and donation management; (8) Inventory management; (9) Risk and need assessment; (10) Capacity building of institutions and people; (11) Continuous improvement in the preparedness and response practices; (12) Agile humanitarian supply chain.

They further indicate that humanitarian supply chain management (HSCM) is about managing the processes and systems involved in mobilizing people, resources, skills and knowledge to help vulnerable people affected by disaster. More lives could be saved, and great degree of suffering could be reduced by the efficiency and effectiveness of humanitarian aid delivery in response to disasters. A researcher asserted that the only way to achieve efficiency and effectiveness is through humanitarian supply chain management as 80% of disaster relief efforts are governed by logistics.

Mebrahtom (2016: p62) in his study finding concludes that, the SCM challenges have a negative effect on the performances of humanitarian aid organizations in the relief and emergency sectors. These challenges are associated with; government related challenges, socio-economic challenges, infrastructure challenges and internal challenges. Therefore, the relief and emergency sector is affected by multiple SCM challenges. He further indicates that supply chain management challenges have negative impact on the humanitarian supply chain performance through; deter the humanitarian organization to achieve timeliness, lead to SC cost increment, lead to failure to deliver relevant humanitarian aid materials, created disharmony in the humanitarian organization, lead to lack of reliability in the humanitarian supply chain, decreased efficiency in the humanitarian SC, increased the risk of the firm`s ability to match demand and supply, lead to unfair competition among humanitarian organization, leads to use un standardization procedures during the resolution of the emergency and leads to reduces organization's ability to change the variety of goods respectively.

2.2.3 Logistics performance in HSCM

Hella&Matthias (2013) in their citation to different scholars describe that useful indicators for evaluating the performance of humanitarian supply chain management include the following: resources, to manage total logistics costs (Beamon&Balcik, 2008; Beamon&Kotleba, 2006; Schulz &Heigh, 2009); outputs, to manage the coverage of attempting the beneficiaries (Beamon&Balcik, 2008; Davidson, 2006); and flexibility, to manage the capability of attempting beneficiaries (Beamon&Balcik, 2008). The coverage indicator has the more humanitarian characterization. The use of performance indicators enables humanitarian organizations' decision-making results to be evaluated. A process may occur independently, when each humanitarian organization makes its decisions regarding resource allocation among the operations of acquisition, transportation, warehousing and management of its own supply chain (Balcik et al., 2010); conversely, it may occur in a centralized manner, i.e., when a company or one of the actors assumes control of decision making for the organizations with whom they are associated. Balcik et al. (2010) consider that partnerships may be established using vertical (between partnerships of different layers of supply), horizontal (between chain links) and lateral techniques (combining and sharing resources with competitors and partners).

According to Endale (2016: p17) humanitarian supply chain performance is measured in terms of time of delivery, quality of delivered materials, reduction in loss of lives, reducing stock-out of

necessary medicines, equipment and other necessary items, best use of donated items. He further states citing to O'Neill and Young (1988) also state that, owing to the central role of logistics in relief operations, the effectiveness and efficiency of the relief chain are important indicators of relief performance. However, the area of relief chain performance measurement of relief chains has not attracted much attention in the literature.

He describe in conclusion of his study finding points out that there is positive and statistically very strong relationship between humanitarian supply chain agility, adaptability, alignment and humanitarian supply chain performances.

Endale (2016: p22) citing to O'Neill and Young (1988) also state that, owing to the central role of logistics in relief operations, the effectiveness and efficiency of the relief chain are important indicators of relief performance. However, the area of relief chain performance measurement of relief chains has not attracted much attention in the literature.

Andargachew (2014: p81) in conclusion of his research finding states that measuring supply chain performance facilitates a greater understanding of the supply chain or logistics activity, and to improve the performance, the stakeholders and staff indispensable input to decision making in the logistic process. Particularly, re-designing of goal, objectives and of staff performance in the logistics activity and continuous improvement in the system not only it is important for comparison and for identifying performance gaps but also necessary for internal objectives satisfying the diverse stack holders that is working with organization.

Endale (2016: p2) states that given the stakes and size of the relief industry (the largest relief organizations engage in billions of dollars' worth of relief and development activities per year), the study of humanitarian relief chains is an important domain for supply chain management that has received little attention. Moreover, despite its significance, performance measures and measurement systems have not been widely developed and systematically implemented in the relief chain. Various factors make performance measurement a challenging task for NGOs. Particularly due to the difficulties associated with measuring program outcomes and impacts in humanitarian relief, NGOs tend to measure performance focusing on inputs rather than outputs. This is common in the nonprofit sector (O'Neill and Young, 1988).

2.2.4 Humanitarian logistics role and HL performance

Logistics activities as the operational component of supply chain management, including quantification, procurement, inventory management, transportation and fleet management, and data collection and reporting. Supply chain management includes the logistics activities plus the coordination and collaboration of staff, levels, and functions. The supply chain includes global manufacturers and supply and demand dynamics, but logistics tends to focus more on specific tasks within a particular program health system (USAID, 2011: p13).

According to Andargachew (2014: p15), humanitarian Logistics is central to disaster relief for several reasons. First, it is crucial to the effectiveness and speed of response for major humanitarian programs, such as health, food, shelter, water, and sanitation. Second, with procurement and transportation included in the function, it can be one of the most expensive parts of a relief effort. Third, since the logistics department handles tracking of goods through the supply chain, it is often the repository of data that can be analyzed to provide post-event learning. Logistics data reflects all aspects of execution, from the effectiveness of suppliers and transportation providers, to the cost and timeliness of response, to the appropriateness of donated goods and the management of information. Thus, it is critical to the performance of both current and future operations and programs.

Citing Kovács and Spens (2007) Mebratom(2016) discusses that there are several important differences between business logistics and humanitarian logistics. While business logisticians work with predetermined actors or partners and predictable demand, humanitarians deal with unknown or changing actors and unpredictable demand. Aid agencies receive many unsolicited and sometimes even unwanted donations, such as: drugs and foods past their expiry dates, where infrastructure has been destroyed; and heavy clothing not suitable for tropical regions. Compared to their business counterparts, humanitarian logisticians have greater challenges in collaboration and coordination with different aid agencies, suppliers, local and regional actors.

Emebet (2016: p66) notes in her research conclusion that vehicle safety/security, response time, cooperation, operating infrastructure and satisfaction of the company are positively related with logistics performance. Which means GOAL Ethiopia practice of giving attention for third party service provider is not enough. The organization logistics procedure, program planning and coordination with rental vehicle transport service have to be improved. This involves integration, co-ordination and collaboration across and within organization departments and throughout the

logistics chain. Therefore to achieve logistics operational objective and to increase the efficiency of logistics performance it requires an integration between internal (intra organizational) and external (inter organizational) functions.

2.2.5 Humanitarian logistics coordination and HL performance

Effective and efficient coordination requires each link of the supply chain to share information and take into the account the impact its actions have on other stages. A lack of coordination is often due to conflict among the humanitarian actors resulting from information asymmetry and a lack of trust. Hence, improving information visibility and accuracy can perhaps improve coordination among humanitarian supply chain actors. Research has broadly discussed the levers and barriers of coordination, thereby providing conceptual and anecdotal evidence, but there remains a paucity of research explaining how and when humanitarian actors can create effective and efficient coordination (Rameshwar, *et.al*. 2018: p5).

Irina,*et.al.* (2011: p3) explain that there has been considerable effort and initiative in the facilitation of logistical coordination among NGOs and other agencies involved in humanitarian relief. While some efforts are more successful than others, there are still untapped benefits and need for improvement in coordination. The literature on humanitarian logistical coordination provides a broad overview of current challenges and obstacles, predominantly based on reports, observations and case studies: Large number and diversity of Participants,Urgency of humanitarian relief response and limited time to establish coordination, limited information sharing and communication, allocation of costs, benefits and risks. Mechanisms to facilitate logistical coordination, and limited personnel dedicated to logistics and coordination.

According to Peter, *et.al*, (2015: p4) relief coordination theory posits that it is possible to orchestrate the efforts of diverse organizations and the orderly and organized direction of activities in their citation to (Seybolt, 1997; McEntire, 1997). The humanitarianism and war project offers a more specific and often cited definition of the concept as: managing information; mobilizing resources and assuring accountability; orchestrating a functional division of labour in the field; negotiating and maintaining a serviceable framework with host political authorities; and providing leadership.

They explain that analysts and scholars also often suggest that coordination is important to improve service delivery effectiveness. Indeed, while effectiveness is rarely defined, it is most often given as the reason why achieving coordination among service providing agencies is

important (Minear, 2002). An effort to reduce duplication, often framed as securing or improving organizational efficiency, is also frequently offered as a rationale for why humanitarian organizations should seek to coordinate their assistance operations.

They also describe in their research conclusion that logistics coordination is poorly embraced among relief giving organizations. They conclude that there is no knowledge-sharing platform, organizations never share partnership building pre-conditions, organizations have no information networks, there is low trust building level and they have low rate of specialization & cross-cutting tasks. It was concluded that though organizations do have specialized levels of staff, who are experienced in humanitarian assistance, and who have high levels of qualifications in logistics coordination other aspects of lacking personnel substitution at logistics coordination level and the little knowledgeable in using different resources availed by donors negates any meaningful logistics coordination.

The study also concludes that organizations don't wait for long before funding is received for humanitarian response and that they always get enough funding to cover programs needs as per proposals. However since donors don't give assurance of funds whenever there is a humanitarian crisis and still also set tough partnership preconditions, this makes humanitarian organizations to opt for logistics planning at organizations individual level. This study's key conclusion is that there is very low coordination mechanism, and lack of it hinders effective logistics coordination thus organizations are unable to reduce cost, have slow response time, delayed projects, constant errors or miscalculation and failure to reach needed beneficiaries.

Emebet (2016: p63) describe that cooperation factors are strongly associated with logistics performance, this is also supported by the finding of study done by : Chandes and Pache (2010) emphasized that lack of coordination affects performance of humanitarian logistics operations and actors from this sector need to engage in collective action for achieving positive impact on their logistics performance.

Mimi S,, *et.al.(*2016: p2) describe that lack of coordination, partly due to the large number of involved humanitarian organizations has, then, impeded the supply chain, leading to late delivery, high operational costs, and ineffective delivery response in disasters.

According to Kaur, *et.al,* (2008: p41) the controlling parameter of achieving coordination is the impact of application of coordination mechanisms (CMs) on the performance measure. The proper implementation and usage of coordination mechanisms improve the performance of the

supply chain (Arshinder 2008). It can be observed that the problems and conflicts in coordinating the supply chain members can be resolved through coordination mechanisms. The importance of coordination mechanism may help in determining the value of coordination in supply chain.

Furthermore they point out that coordinating the supply chain across organizational boundaries may be one of the most difficult aspects of supply chain management. Many firms simply are unaware of the fundamental dynamics of supply chains, but even those firms that are enlightened enough to understand these dynamics are often unable to realize inter-organizational coordination. Often the most effective supply chains have a dominating organization that sees the benefits of SCC and forces the rest of the supply chain to comply (i.e., global leader in retailing such as Wal-Mart).

Amin M., et.al. (2018: p1) citing to different scholars also put that since the 2003 Bam earthquake and 2004 Indian Ocean tsunami, considerable efforts and strategies have been suggested to increase and improve the coordination along the process of disaster relief supply chains, including the cluster system (Jahre and Jensen 2010) and the clarity of roles and responsibilities within the humanitarian clusters (Jensen and Hertz 2016), civil–military coordination(Heaslip2012), collaborative procurement (Wild and Zhou 2011), flexible transportation(Besiou, Pedraza-Martinez, and Van Wassenhove, 2014), flexible supply base (Ertem, Buyurgan,and Rossetti, 2010), information sharing (Day et al. 2012), postponement (Jahre and Heigh2008),supply chain visibility (Maghsoudi and Pazirandeh, 2016), standardization (Jahre and Fabbe-Costes, 2015), decentralized prepositioning (Jahre and Heigh2008), supply chain visibility (Maghsoudi andPazirandeh2016), and synchronization of resource flows (i.e. information, money, relief services, and supplies) (Day *et al*. 2012).

According to Mansidão, *et al*. (2014) model cited by Emebet (2016: p47), in humanitarian supply chain the cooperation and exchange of data between actors (enter as well as intra) involved in a disaster/any development program are indispensable in order to effectively respond to the emergency or normal situation request. Moreover, the standardization of procedures could accelerate and improve the resolution of the disaster.

2.2.6 Challenges of humanitarian supply chain management

There are several challenges relating to the humanitarian supply chain that are specific to disaster response contexts. These include a lack of coordination between government and humanitarian actors at the operational level and in pre planning and after action reviews/evaluations, weak

structures and processes to facilitate regular and appropriate interaction and substantive gaps in existing guidance on specific issues. Peter Nyandega Agwata (2014), classified humanitarian supply chain challenges as natural and man-made. The major categories of the humanitarian supply chain barriers covered in this research dealt with governmental related challenges, socio-economic challenges, infrastructure challenges and internal challenges. Each of the major categories had multiple subcategories. The subcategories address individual facets of the major categories which pose more specific problems for the humanitarian supply chain (Mebrahtom, 2016: p16).

He further describes lack of coordination among humanitarian organizations at the scene of a disaster is ordinary, as there can be as many as several hundred humanitarian organizations at the scene to carry out relief operations, all with different political agenda, ideologies and religious beliefs and all fighting for media and donor attention (Van Wassenhove, 2006). Oloruntoba and Gray (2005), posits that the humanitarian supply chain often entails high level of uncertainty in terms of demands, supplies and assessments. Logisticians are often frustrated by the need to operate in volatile environment. The performance management particularly the performance of supply chain is equally a challenge for humanitarian organizations. As clearly stated by Kunz and Reiner (2011), the humanitarian supply chain factors categorized as socio-economic situational factors, environmental situational factors, funding status, government situational factors, organizational factors and supply chain decision as cited by (Jane Kiende, 2013).

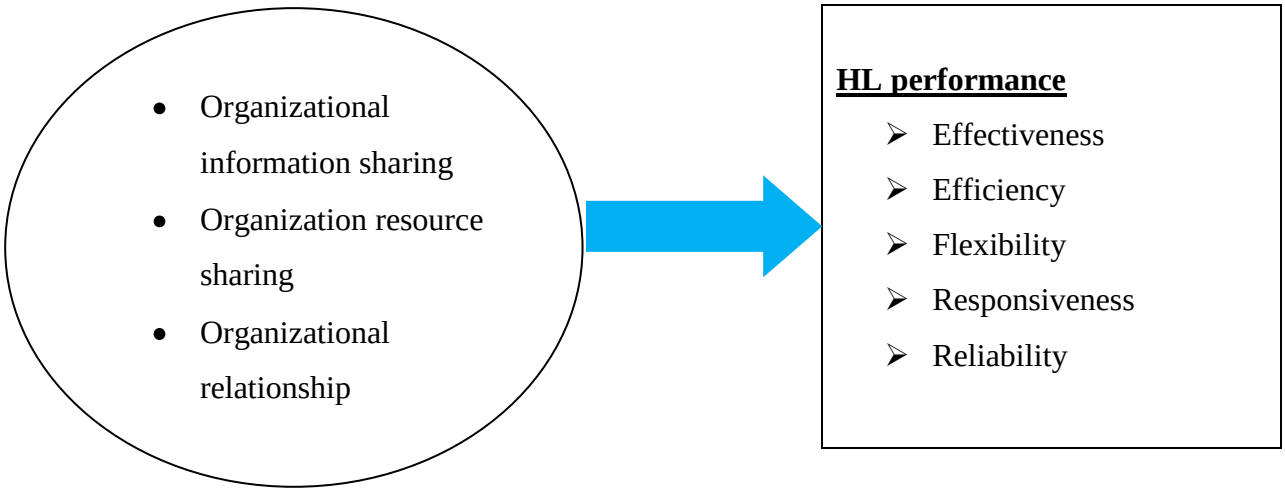
Peter, et.al (2015: p6) state citing to Thomas (2003) who identified human resources as a challenge facing humanitarian organizations. Thomas points out that there may be problems with employee reliability stemming from lack of training. There is a notable lack of employees who are knowledgeable in supply chain or logistics management. Thomas points out that "an actor, an osteopath, an extreme sports enthusiast, a nurse and a country manager" were acting as head logisticians in the organizations she studied. "Neither their backgrounds nor their values are geared toward process improvement". Likewise, Long (1997) notes that most people from development agencies have backgrounds in public policy or third world development and professional logisticians are rare. The unpredictable nature of disasters makes it difficult to retain well trained employees and those who have been trained are often volunteers who can only work for short periods before they must return to their "real world" jobs. Organizations may experience as high as 80 percent annual turnover in field logistics personnel further

compounding personnel issues. This results in a constant influx of untrained personnel, inexperienced in the particulars of logistics within the organization and relief as a whole.

2.3 Conceptual framework of the study

A conceptual framework of the study is developed based on the social network theory, the resource based theory and relief Coordination Theory. In the conceptual framework; coordination variables are the three main variables that influence the efficiency and effectiveness of the operations of humanitarian organizations. The variables are inter-organization information sharing, inter-organization resource sharing and organizational relationship. These are meant to check the core coordination areas that the humanitarian organization utilize or may possibly utilize and their respective extent. These variables will be looked at against operational efficiency and effectiveness within the humanitarian organizations with regard to logistics performance which determines savings on operational costs, quick response time, and number of projects concluded, number of organizations partnering & impact on the victims. The humanitarian supply chain performance will be compared against the performance of logistics coordination in the organization in light of the three constructs.

Figure1. **Conceptual frame work**



Source: Peter, et.al, (2015).

2.4 Research trends in humanitarian logistics coordination

Many studies have examined coordination in the context of commercial supply chains, but few have done so in the context of their humanitarian counterparts. Several authors have focused on understanding coordination itself, and the challenges resulting from a lack thereof in humanitarian supply chains. Furthermore, the number of studies related to the development of qualitative and quantitative strategies to overcome these challenges has increased in the last five years (Fabiola, et.al, 2017: p4).

While it is axiomatic that the various actors' involved in disaster relief, including governmental organizations, military, humanitarian sector and private businesses should collaborate and coordinate their actions with one another, they often do not. Coordination within disaster relief is seen as a means to reduce duplication of effort and to increase the effectiveness and efficiency of the disaster relief operations. Indeed, humanitarian logistics literature is bereft of any form of organizational model that nurtures cooperation beyond the universal imperative for actors to collaborate (Mark &Eija, 2011: p8).

The coordination problems in SCM are solved by implementing some coordination mechanisms in supply chain activities, which may result in the improvement of some performance measures. The supply chain activities have been considered in isolation to solve their respective coordination problem. The coordination problems may not be same in all activities of supply chain. The requirements of coordinating whole SC may vary with SC activity, with some interface of SC, with number of echelons in SC and with process of SC. There are different activities and different coordination problems in whole supply chain. Coordinating one activity may not help to improve supply chain system wide performance (Kaur, *et.al*, 2008: p41).

Overall, the practical coordination challenges and bottlenecks along the disaster relief supply chains lead humanitarian organizations to implement poor coordination mechanisms, thus obtaining poor performance outcomes. Coordination mechanisms among the involved actors, some of whom have competing missions, remain a critical challenge and are under-examined. More academic research is required to examine the practical solutions to overcome the coordination challenges in a humanitarian context

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

Research methods or techniques refer to the methods used in performing research operations. In other words, all those methods which are used during the course of studying research problem are termed as research methods. Research methods are those methods which are concerned with the collection of data and the analytical tools of research statistical techniques which are used for establishing relationships between the data to evaluate the accuracy of the results (Kothari 2004).This chapter therefore describes the methods that will be used in this study including the choice of particular research designs, data type and source of data, research approach, data gathering technique and instruments, sampling and sampling techniques, data analysis techniques, validity and reliability of the study along with an appropriate justification associated with each approach.

3.1 Description of the Study Area

The study was conducted in ERCS which includes its head office in Addis Ababa and program sites in different parts of the country located in different regions and in current emergency locations and refugee sites. ERCS Ethiopia has been implementing emergency, rehabilitation and development programs in Ethiopia since8 July 1935. ERCS presently provides humanitarian service in the areas: Disaster preparedness and response, disaster risk reduction (community resilience building), essential drug program, capacity development for humanitarian Services and humanitarian diplomacy.

All workers in ERCS were source population. All logisticians who are working in logistics department from assistant to senior manager position were considered target population of the study. All logisticians and supply chain management staff who have served the organization for at least for one year were included to participate in the study. However, staff who were not cooperative to participate in the study and those who were not available in the study period were excluded from the study.

3.2 Research Approach

Both quantitative and qualitative study approach was conducted in order investigate humanitarian logistics coordination role, practice and challenges aligning with the relationship with HL performance in HSCM of the organization. Quantitative research technique was employed in order to obtain the logistics and supply chain team perceptions on logistics coordination and supply chain practices in the organization. Qualitative research method allows the use of historical analysis and observations.

According to Creswell (2013), mixed research method is suitable for the development of concepts which help us to understand social phenomena in natural (rather than experimental) settings, giving due emphasis to the meanings, experiences and views of the participants. It is generally used to gain an understanding of underlying reasons as well as to uncover the factors affecting the effectiveness of humanitarian supply chain in handling the relief efforts as well as to find answers to the research problem.

Different methods of data collection like diagnosis structured questionnaire and observation were employed. Information was collected from the logistics, procurement and supply chain department and those who provide related service to the program. Therefore, employees of ERCS staff who are engaged in logistics activities and supply chain management were included in the data collection process.

3.3 Research Design

Descriptive and causal research design was used in this particular study. Descriptive research design was used in order to understand and systematically describe the use and practice of humanitarian logistics coordination schemes in supply chain management. More so, a descriptive study was conducted in order to ascertain and be able to describe the characteristics of the variables of interest in a situation. The design was used to identify the most influential variables that affect logistics coordination efforts and its relationship with HL performance. A causal research design can be used for studying a cause and effect relationship between dependent and independent variables and regression analysis (whether simple or multiple) is termed as causal analysis between two or more variables. In quantitative studies, researchers advance the relationship among variables and pose this in terms of questions or hypotheses. Quantitative research is based on the measurement of quantity or amount. It is applicable to phenomena that can be expressed in terms of quantity. Qualitative research, on the other hand, is concerned with

qualitative phenomenon, i.e., phenomena relating to or involving quality or kind. A case study method can deploy cross sectional data collection technique in a given organization or organizations (Kothari 2004). Hence, the study chosen to use Multiple Regression to analyze cause-effect relationship of variables and it also used descriptive statistics to discover issues that would not be covered by the regression model. The study has also run the cross tab in order to examine the differences among respondent groups. Different literatures and empirical studies were reviewed to gain more insights and background information with regard to coordination of humanitarian logistics.

3.3 Population and Sample

ERCS was selected for this study because it is one of the leading humanitarian organizations where significant works related to logistics and supply chain management are done throughout the country to support its program. Target populations purposively selected were workers of ERCS who work in logistics area and its support system and related services. ERCS has permanent national staff and international staff who work both in Addis Ababa and field level. In addition there are workers in different parts of the country where it has outlying branches in most regions. With regard to sampling method, the study did not undertake rigorous statistical sample size calculation rather considered census method due to the limited population size of the study. So the sample size included 56 respondents taken from 82 individuals who work in the specified area for the purpose of this study. Therefore the researcher considered all workers of ERCS as source population and focused only on staffs that have relationship with logistics and its support system as the target population for the study.

3.4 Data Sources and Types

To achieve the specified objective, both primary and secondary data sources were used. The primary data was collected from respondents who are related to the program or logistics activity and supply chain management through questionnaire designed by the researcher. They include program managers, regional logistics supervisors, logistics officers, transportation managers, IT managers, warehouse managers and SC officers. In addition to the primary data, secondary data was gathered from published and unpublished sources.

3.5 Data Collection Procedures

In order to investigate logistics coordination role and practice in supply chain performance, in case of ERCS, both primary and secondary sources were used as a supply of data. The primary

data was collected from ERCS (both head and field office) by distributing questionnaire and through observation. The secondary data was collected from different articles (extensive article reviews will be conducted), books, and documents from the organization data base were reviewed to supplement the primary data.

Based on the research conceptual model addressed in the literature review section, 3 constructs were determined as associated factors affecting coordination performance of humanitarian logistics. 16 items from these constructs are obtained from the literature of which the questionnaire was adapted to address logistics coordination performance. The questionnaire consists of four sections so as to cover objectives of the research including: introduction, respondents' profile, associated factors affecting performance of logistics coordination, humanitarian logistics and humanitarian supply chain performance. An organization based case study cross-sectional study design using quantitative methods of data collection was employed. To determine the performance of humanitarian logistics coordination and humanitarian supply chain performance, a total of 8 constructs and 36 items were adapted. Furthermore a total of 20 items were adapted to investigate humanitarian logistics coordination challenges and success factors in the organization.

Close- ended questions were used to collect data from selected respondents (staff of the organization) that work with logistics provision and supply chain. The question for both questionnaires were short, precise and clear in a manner that they will be understandable to get necessary information from the respondents. Nominal scale was designed to get information on respondent profile which composed of mutually exclusive category. A five point Likert scale was designed to ask respondents for scoring items ranging from 1 =to strongly disagree to 5 = to strongly agree in which the subjects indicate their degree of agreement or disagreement with each of a number of statements. Modification of the questions was done based on the experts' advice and respondents' feedback to increase reliability of the instrument.

The questionnaire was addressed to ERCS staff that has direct relationship with logistics activity through email and personally by the researcher. The questionnaire was prepared in English language since all the respondents know the language well as ERCS Ethiopia working language is English.

3.6 Ethical Consideration

Ethical clearance was obtained from Addis Ababa University School of Commerce and permission was obtained from the ERCS Head office. Written consent to participate in the study was secured before conducting the interview and distribution of questionnaire. For this a consent letter was attached to cover page of each questionnaire stating about the general purpose of the study and issues of confidentiality to be discussed by interviewers before they start feeling the questionnaires. More so, the respondents' information was kept in strict confidentiality and they would remain anonymous. Additionally, participants were informed that they have a full right to refuse or discontinue participating.

3.8. Research validity and reliability

Various precautions were applied during the research process to enhance the validity and reliability of the sample data gathered. Explanatory remarks were given to acquaint the participant about each indicators reference in relation to humanitarian logistics and this particular study.

According to Zikmud et al (2010) cronbach's alpha is a measure for the internal consistency of items to the concept. Scales with coefficient alpha between 0.8 and 0.95 are considered to have very good reliability, scales with coefficient alpha between 0.7 and 0.8 are considered to have good reliability and coefficient alpha between 0.6 and 0.7 indicates fair reliability.

Reliability of a research instrument concerns the extent to which the instrument yields the same results on repeated trials. The questions in the questionnaire that measure the same variable were grouped together and, the researcher performed a pilot study on the questionnaires before the survey by sending them to logistics staffs who work in humanitarian logistics as pilot scale for its reliability and the value of cronbanch's alpha (α) was calculated. The reliability and the value of cronbach's alpha reliability test showed very good internal consistency with a coefficient of 0.9 and higher. The cronbanch's alpha coefficient of variables for the pilot test is depicted in table1. Aggregate cronbach's alpha table included in Annex I.

Table 1: Cronbach's alpha coefficient of variables for the pilot test

Variables	Cronbach'salpha Coefficient	No of items
Resource sharing	0.971	5
Information sharing	0.975	6
Organizational relationship	0.966	5
HL Coordination	0.990	16
Effectiveness	0.958	4
Efficiency	0.955	3
Flexibility	0.975	5
Responsiveness	0.964	4
Reliability	0.976	4
HSC performance	0.993	20

Data source: own survey 2019

Validity: In order to ensure the quality of this research design content of the research instrument were checked .The content validity was verified by the advisor of this research who looked in to the appropriateness of questions and the scales of measurement. Peer discussion with other researchers and logisticians was also conducted since it is another way of checking the appropriateness of questions. This was done to find out whether the developed instruments measures what it was meant to measure and also to check the clarity, length, structure and wording of the questions. This test also helped the researcher to get valuable comments to modify some questions. The determination of the research questions and unit of analysis were the means to attain the content validity for this research. Construct validity was attained by the definition of humanitarian supply chain principles in terms of the relationship with logistics coordination where all interview questions were based on literature and observation. Conceptual framework was presented and indicators to measure the existence and extent of challenges were operationalized for the purpose of this study.

The questionnaire was forwarded to the subject matter specialists to check whether the questionnaires measure what they are intended to measure. These activities enable the questionnaire to have reliability and validity.

3.9 Data Analysis

The data collected was organized and analyzed. Data was analyzed by using both quantitative and qualitative methods. The researcher used quantitative data analysis methods comprising of both descriptive and inferential statistics. The data that was collected through questionnaires was edited, coded, entered into the Statistical Package for Social Sciences (SPSS) version 21 for analysis and generation of frequency tables, charts and graphs. Statistical inference was drawn.

Correlation analysis was used to establish the relationship between the HL coordination variables (inter-organization information sharing, inter-organization resource sharing and Organizational relationship) and HL performance based on measures of effectiveness, efficiency, responsiveness, flexibility and reliability. The resulting correlation coefficient (R) gave the indication of the strength and direction of the relation between the variables. The proposed model (HL coordination variables) was tested using Multiple Linear Regression. The quantitative data gathered from the questionnaires form the major part of the primary data that was imputed. The data from interviews and questionnaire were generated in tables, bar charts and text. The findings were supported by various reference sources including literature, research and journals articles.

CHAPTER FOUR
RESULTS AND DISCUSSION

4.1. Response rate

According to the American Association for Public Opinion Research, response rate in survey research is calculated as the number of people who answered the survey divided by the number of people in the sample. Hence, the response rate of the study was found to be 76% (63/82), and of which questioners were discarded for they were incomplete. 68% of questioners from the total targeted population were found complete and treated in the study. This sample was thought enough to proceed with based on the suggestion made by (Cooper & Schindler 2003) and the study sample size equal to or above 30 is statistically sufficient for generalization.

4.2. Descriptive analysis

Eight variables which were identified from literatures were considered for the study of which three were factors associated with humanitarian logistics coordination: Organization resource sharing, organization information sharing and organization relationship while three of the variables are those related to humanitarian supply chain management performance which include: Effectiveness, efficiency, flexibility, responsiveness and reliability. There were also other factors included to investigate the major challenges and success factors in humanitarian logistics coordination in the organization which were used to make qualitative analysis with respect to the major variables indicated above to make further association in the study area.

4.2.1 Cross tabulation

Annex 2 displayed the cross tab results. Cross tabulation was carried out so as to learn if there are differences in the responses among different respondent groups. Years of work experience and education level were crossed with the variables of the study. For instance, it was realized that among the respondent groups who were categorized under ‘5-10 years of work experience’ (41% the total population) believed that resource sharing was recognized in ERCS at a great extent (mean value=3.8), information sharing was implemented to a moderate extent (mean value=3.74), availability of organizational relationship was to a great extent (mean value=4.0).

From the cross tab result found when education crossed with variables of the study, it was deduced that the majority of respondents (46%) were degree holders and they believed that resource sharing was recognized in ERCS at a moderate extent (mean value=3.5), information

sharing was implemented to a moderate extent (mean value=3.34), availability of organizational relationship was to a moderate extent (mean value=3.74).and finally same respondent groups believed that the overall performance of humanitarian logistics at ERCS was rated to be to a moderate extent.

4.2.2. Respondents profile

The first part of the questionnaire consists of questions about respondents' profile. This part of the questionnaire requested a limited amount of information related to personal and professional characteristics of respondents. Accordingly the following variables were described in Table 2 below, this variables includes: service year, educational back ground, duty station and position in the organization.

Table 2: Summary of Demographic characteristics of respondents

Characteristics	Description	frequency	percentage
Education	Diploma	10	17.86
	Degree	26	46.43
	Masters and above	14	25.00
	Others	6	10.71
Service years	Less than 5 years	21	37.50
	5-10 years	23	41.07
	Above 10 years	12	21.43
Position in the organization	Manager	12	21.43
	Logistics staff	22	39.29
	Logistics Coordinator	14	25.00
	Others	7	12.5
Duty station	SNNPR	3	5.56
	Addis Ababa	46	82.14
	Amhara	4	7.14
	Somali	3	5.56

Own Source survey: 2019

The result on education (Table 2) shows that 17.86% of the respondents were under graduate and 46.43% of the respondents were post graduate while 25% diploma holders. The finding indicates

that the respondents can understand the benefits and challenges of use of logistics coordination and its support systems towards humanitarian supply chain management.

The result on education (Table 2) shows that 47.5% of the respondents were under graduate and 31.3% of the respondents were post graduate while 21.3% have had diploma. The finding indicates that the respondents can understand the benefits and challenges of use of logistics coordination practice and associated factors in HSC management.

From the respondents profile (Table 2) 37.5% of the respondents had worked in their organization less than 5 years, 41.07% of the respondents indicated that they had worked in the organization from 5-10 years while 21.43% of the respondents said they have worked in the organization over 10 years. The result indicates that majority of the respondents have worked in ERCS for above 5 years indicates that they understand the effect logistics coordination on logistics performance and overall supply chain management.

The result on position in the organization (Table2) shows that from 56 respondents, 23.21% are managers, 35.71% are logistics staff, 19.64% are logistics coordinators while 21.43% are other staffs who work in a related area such as risk analysis, procurement, finance and IT departments. This indicates that the majority of respondents are from logistics department and related areas who can understand the practical impact of logistics coordination in humanitarian supply chain management.

The result on duty station (Table2) shows that the majority of the respondents (82.14%) including oromia region and Addis Ababa coordination office were based in Addis Ababa with frequent field visit, 7.14% of the respondents were based in Amhara, 5.56 % respondents were based in SNNR while 5.56% of respondents were based in Somali region. The result indicate that majority of the respondents based in Addis Ababa with frequent field visit that is an indication the respondents use logistics services from head office to different field site and coordination departments. Thus respondents have sufficient experience in evaluating the practice and challenges in HL coordination in overall HSC performance in the organization.

The first objective of the study sought to establish the extent to which logistics coordination was practiced at ERCS based on the three parameters namely information sharing, resource sharing and organizational relationship. The responses were generated on a five point Likert scale; 1= Strongly Disagree, 2= Disagree, 3= Not Sure, 4= Agree and 5= Strongly Agree. The respondents were required to state their level of agreement.

4.2.3. Organization resource sharing in humanitarian logistics coordination

The aspect linked to resource sharing in humanitarian logistics coordination indicates the degree of sharing important resources that supports coordination in relief efforts. Five questions were raised for respondents in order to understand and examine what they feel about resource sharing mechanisms and practices. It includes five sub items where each item tries to find out issues concerning availability of mechanisms to logistics coordination, sharing of key resources between actors, distribution centers, financial resource sharing and donor funding partnerships. The following table shows summarized responses by number and percentages.

Key: Strongly disagree=SD, Disagree= D, Neutral= N, Agree= A, Strongly agree= SA

Table 3: Summary of Responses of respondents organization resource sharing

Question items	**SD**	**D**	**N**	**A**	**SA**	**Total**
	freq. & Percent	freq. & Percent	freq. & Percent	freq. & Percent	freq. & Percent	freq. & Percent
Mechanisms & preconditions to get access other valuable resources	1 (1.8)	2(3.6)	10(17.9)	38(67.9)	5(8.9)	56(100)
Sharing technologies, expertise, systems and other assets.	1(1.8)	4(7.1)	15(26.8)	30(53.6)	6(10.7)	56(100)
Sharing of high volume of distribution center or warehouse	2(3.6)	3(5.4)	16(28.6)	27(48.2)	8(14.3)	56(100)
High rate of financial resource sharing: field sites,	3(5.4)	7(12.5)	16(28.6)	24(42.9)	6(10.7)	56(100)
Assurance of funding all the time and donor funding partnership.	2(3.6)	10(17.9)	26(46.4)	14(25)	4(7.1)	56(100)
Average (%)	**3.24**	**9.3**	**29.66**	**47.54**	**10.34**	**100**

Number of respondents: 56

Source: own survey: 2019

The above table 3 depicted the result on examining the current logistics coordination in terms of resource sharing where the respondents were requested to answer requirements of resource sharing. The result show on average that 29.66% of respondents replied Neutral, the majority of

respondents (47.54%) agreed and 10.34% strongly agreed in the implementation of resource sharing based on the items provided. It can be concluded that resource sharing practice of ERCS is implemented to a great extent where rate of fund assurance and partnership precondition were practiced to a relatively moderate extent.

4.2.4. Organization information sharing in humanitarian logistics coordination

The aspect linked to information sharing in humanitarian logistics coordination indicates the degree of sharing important information that supports coordination in relief efforts. Six questions were raised for respondents in order to understand and examine what they feel about the degree of information sharing and availability of mechanisms. It includes six sub items where each item tries to find out issues concerning availability of partnership building preconditions, degree of sharing of key information between actors, information networks, trust building level and rate of specialization. The following table shows summarized responses by number and percentages.

Table 4: Summary of Responses of respondents organization information sharing

Question items	**SD**	**D**	**N**	**A**	**SA**	**Total**
	freq. & Percent	freq. & Percent	freq. & Percent	freq. & Percent	freq. & Percent	freq. & Percent
We share high volume Knowledge	1(1.8)	6(10.7)	15(26.8)	30(53.6)	4(7.1)	56(100)
We have a Partnership building pre-conditions	3(5.4)	13(23.2)	18(32.1)	10(17.9)	12(21.4)	56(100)
Integrated info networks horizontally, vertically	1(1.8)	3(5.4)	22(39.3)	20(35.7)	10(17.9)	56(100)
We have trust building level with stakeholders	1(1.8)	4(7.1)	18(26.8)	28(50)	8(14.3)	56(100)
We have high exchange of information across SC	1(1.8)	5(8.9)	24(42.9)	18(32.1)	8(14.3)	56(100)
We have high rate of specialization	2(3.6)	3(5.4)	25(44.6)	20(35.7)	6(10.7)	56(100)
Average (%)	**2.88**	**12.14**	**37.14**	**34.28**	**15.72**	**100**

Number of respondents: 56

Source: own survey: 2019

The above table 4 depicted the result on examining the current logistics coordination in terms of information sharing where the respondents were requested to answer requirements of information sharing based on literature. The result show on average that 37.14% of respondents replied Neutral, 34.28%of respondents agreed and 15.72% strongly agreed in the implementation of information sharing based on the items provided. Only small portion of respondents (12.14%) disagreed on the practice of information sharing in the organization. Thus it can be concluded that information sharing practice at ERCS was in good condition except rate of information exchange and rate of specialization which were implemented to a moderate extent.

4.2.5. Organization relationship in humanitarian logistics coordination

The aspect linked to organization relationship in humanitarian logistics coordination indicates the degree of interaction and relationship between humanitarian organization, sharing of important knowledge and experience and process alignment that improves coordination in relief efforts. Five questions were raised for respondents in order to understand and examine what they feel about the extent to which organizational relationship is implemented. It includes five sub items where each item tries to find out issues concerning stability and transparency of interactions, degree of sharing of skills/experience and synchronization of process.

Table 5: Summary of Responses of respondents in organizational relationship

Question items	**SD**	**D**	**N**	**A**	**SA**	**Total**
	freq. & Percent	freq. & Percent	freq. & Percent	freq. & Percent	freq. & Percent	freq. & Percent
We have stable interactions and transparent r/ship.	1(1.8)	5(8.9)	10(17.9)	34(60.7)	6(10.7)	56(100)
Long term relationships	0	2(3.6)	18(32.1)	32(57.1)	4(7.1)	56(100)
We share high amount of internal skills/idea/knowledge/experience	1(1.8)	4(7.1)	9(16.1)	28(50)	14(25.00)	56(100)
We share high amount of external skill/ideas/knowledge/experience.	0	4(7.1)	18(32.1)	26(46.3)	8(14.3)	56(100)
Synchronization of processes.	0	2(3.6)	14(25)	34(60.7)	6(10.7)	56(100)
Average (%)	**0.72**	**6.06**	**24.64**	**54.96**	**11.42**	**100**

Number of respondents: 56

Source: own survey: 2019

The above table 5 depicted the result on examining the current logistics coordination in terms of organizational relationship where the respondents were requested to answer requirements of resource sharing. The result show on average that 24.64% of respondents replied Neutral, the majority of respondents (54.96%) of respondents agreed and 11.42% strongly agreed in the implementation of organizational relationship based on the items provided. In conclusion organizational relation was practiced to a great extent at ERCS. In general based on the three parameters described in the conceptual framework it can be concluded that logistics coordination practice at ERCS was to a great extent.

4.3. Humanitarian logistics performance

The questionnaire includes 20 indicators that are used to evaluate the performance of humanitarian logistics in ERCS based on five variables: Effectiveness, efficiency, flexibility, responsiveness and reliability. The respondents asked to give answer based on five Likert scale (strongly disagree, disagree, neutral, agree and strongly agree).The following table shows summarized responses by number and percentages

4.3.1 Effectiveness

Table 6: Summary of responses of respondents in effectiveness in HL performance

Question items	**SD**	**D**	**N**	**A**	**SA**	**Total**
	freq. & Percent	freq. & Percent	freq. & Percent	freq. & Percent	freq. & Percent	freq. & Percent
On-time delivery performance has increased.	1(1.8)	4(7.1)	26(46.4)	23(41.1)	2(3.6)	56(100)
Right, the right place and to the right beneficiaries all the time.	0	10(17.9)	12(21.4)	30(53.6)	4(7.1)	56(100)
Customer satisfaction is improving in terms of coverage.	2(3.6)	6(10.7)	14(25)	30(53.6)	4(7.1)	56(100)
Sharing of key info, incentive realignment and teamwork	0	16(28.6)	6(10.7)	28(50)	6(10.7)	56(100)
Average (%)	**1.35**	**16.08**	**25.88**	**49.58**	**7.13**	**100**

Number of respondents: 56

Source: own survey: 2019

The above table 6 depicted the result on examining the current logistics performance in terms of its effective implementation practice where the respondents were requested to answer based on the requirements outlined from literature. The result show on average that 25.88% of respondents replied Neutral, the majority of respondents (49.58%) of respondents agreed and 7.13% strongly agreed in the implementation of effective mechanisms in HSCM based on the items provided.

4.3.2 Efficiency

Table 7: Summary of responses of respondents in efficiency of HL performance

Question items	**SD**	**D**	**N**	**A**	**SA**	**Total**
	freq. & Percent	freq. & Percent	freq. & Percent	freq. & Percent	freq. & Percent	freq. & Percent
The logistics service has reduced total distribution and delivery cost.	6(10.7)	14(25)	18(32.1)	16(28.6)	2(3.6)	56(100)
The logistics service has reduced employees' overtime hours.	4(7.1)	11(19.6)	14(25)	21(37.5)	6(10.7)	56(100)
There is duplication of efforts in logistics management in ERCS.	2(3.6)	6(10.7)	27(48.2)	17(30.4)	4(7.1)	56(100)
Average (%)	**7.13**	**18.43**	**35.1**	**32.17**	**7.13**	**100**

Number of respondents: 56

Source: own survey: 2019

The above table 7 depicted the result on examining the current logistics performance in terms of its efficient implementation practice where the respondents were requested to answer based on the requirements outlined from literature. The result show on average that 35.1% of respondents replied Neutral, 32.17% of respondents agreed and 7.13% strongly agreed in the implementation of efficient mechanisms in HSCM based on the items provided.

4.3.3 Flexibility

Table 8: Summary of responses of respondents in flexibility of HL performance

Question items	SD	D	N	A	SA	Total
	freq. & Percent	freq. & Percent	freq. & Percent	freq. & Percent	freq. & Percent	freq. & Percent
SC is able to deliver full list items requested and exceptional.	6(10.7)	15(26.8)	17(30.4)	16(28.6)	2(3.6)	56(100)
Resource/capability sharing, job dispatching among d/t parties.	2(3.6)	7(12.5)	14(25)	25(44.6)	8(14.3)	56(100)
We have improved order fulfillment capacity.	1(1.8)	10(17.9)	23(41.1)	16(28.6)	6(10.7)	56(100)
We have reduced the quantity of purchased material.	2(3.6)	11(19.6)	17(30.4)	14(25)	12(21.4)	56(100)
There is personnel substitution at logistics coordination level.	3(5.4)	8(14.3)	30(53.6)	7(12.5)	8(14.3)	56(100)
Average (%)	**5.02**	**18.22**	**36.1**	**27.86**	**12.86**	**100**

Number of respondents: 56

Source: own survey: 2019

The above table 8 depicted the result on examining the current logistics performance in terms of flexibility metrics and its implementation practice where the respondents were requested to answer based on the requirements outlined from literature. The result show on average that 36.1% of respondents replied Neutral, 27.86% of respondents agreed and 12.86% strongly agreed in the implementation of flexible mechanisms in logistics management based on the items provided.

4.3.4 Responsiveness

Table 9: Summary of responses of respondents in responsiveness of HL performance

Question items	SD	D	N	A	SA	Total
	freq. & Percent	freq. & Percent	freq. & Percent	freq. & Percent	freq. & Percent	freq. & Percent
SC has minimized order fulfillment lead times, and optimized inventory levels.	2(3.6)	10(17.9)	24(42.9)	10(17.9)	10(17.9)	56(100)
SC is able to deliver goods and services within promised time during normal situation.	2(3.6)	6(10.7)	16(28.6)	26(46.4)	6(10.7)	56(100)
SC is able to deliver goods and services within promised time during emergency.	5(8.9)	16(28.6)	6(10.7)	27(48.2)	2(3.6)	56(100)
SC has on time replenishment & coverage.	2(3.6)	12(21.4)	16(28.6)	20(35.7)	6(10.7)	56(100)
Average (%)	**4.93**	**19.65**	**27.7**	**37.05**	**10.73**	**100**

Number of respondents: 56

Source: own survey: 2019

The above table 9 depicted the result on examining the current logistics performance in terms of responsiveness and its implementation practice where the respondents were requested to answer based on the requirements outlined from literature. The result show on average that 27.7% of respondents replied Neutral, 37.05% of respondents agreed and 10.73% strongly agreed in the implementation of responsive mechanisms in HSCM based on the items provided.

4.3.5 Reliability

Table 10: Summary of responses of respondents in reliability of HL performance

	SD	D	N	A	SA	Total
	freq. & Percent	freq. & Percent	freq. & Percent	freq. & Percent	freq. & Percent	freq. & Percent
Transportation, warehousing, and distribution system is well organized and convenient.	2(3.6)	9(16.1)	14(25)	25(44.6)	6(10.7)	56(100)
Supply chain is able to update requesters about the status of order on regular manner.	5(8.9)	15(26.8)	10(17.9)	22(39.3)	4(7.1)	56(100)
We have consistent delivery of any given quantity or volume of commodity	7(12.5)	15(26.8)	24(42.9)	8(14.3)	2(3.6)	56(100)
We have active collaboration within and across logistic distribution sectors.	3(5.4)	11(19.6)	12(21.4)	26(46.4)	4(7.1)	56(100)
Average (%)	**7.6**	**22.34**	**26.8**	**36.15**	**7.13**	**100**

Number of respondents: 56

Source: own survey: 2019

The above table 10 depicted the result on examining the current logistics performance in terms of reliability metrics and its implementation practice where the respondents were requested to answer based on the requirements outlined from literature. The result show on average that 26.6% of respondents replied Neutral, 36.15% of respondents agreed and 7.13% strongly agreed while 22.34% disagreed and 7.6% strongly disagreed in the implementation of reliable mechanisms in HSCM based on the items provided. In general based on the five parameters from literature it can be concluded that HSC performance at ERCS was to a great extent.

4.4. Humanitarian logistics coordination challenges

In the aspect linked to challenges in humanitarian logistics coordination respondents are given outline of some of the most pressing challenges in humanitarian logistics based on literature and allowed to select the degree of their impact in humanitarian organization in management of relief

logistics. Eleven questions were raised for respondents in order to understand and examine what they feel about the extent to which the under mentioned items are implemented and pose critical stakes in their HSCM practices. The following table shows summarized responses by number and percentages.

Table 11: Summary of Responses of respondents in logistics coordination challenges

Question Items	**SD**	**D**	**N**	**A**	**SA**	**Total**
	freq. & Percent	freq. & Percent	freq. & Percent	freq. & Percent	freq. & Percent	freq. & Percent
Large number and diversity of Participants.	2(3.6)	10(17.9)	18(32.1)	23(41.1)	3(5.4)	56(100)
Urgency of humanitarian relief response and limited time to establish coordination.	1(1.8)	6(10.7)	9(16.1)	32(57.1)	8(14.3)	56(100)
Sufficiency of donors funding for logistics infrastructure, and long term disaster preparedness.	3(5.4)	11(19.6)	14(25)	21(37.5)	7(12.5)	56(100)
Absence of policy, procedures, mechanisms to coordination.	5(8.9)	15(26.8)	14(25)	16(28.6)	6(10.7)	56(100)
Limited personnel dedicated to logistics coordination.	2(3.6)	18(21.4)	28(50)	6(10.7)	8(14.3)	56(100)
Absence of standardization of operations, common guidelines	4(7.1)	16(28.6)	15(26.8)	15(26.8)	6(10.7)	56(100)
Different logistics capability, size, authority, and experience a	2(3.6)	14(25)	18(32.1)	18(28.6)	6(10.7)	56(100)
Uncertainty and complexity of decision making regarding logistics operations.	6(10.7)	8(14.3)	12(21.4)	26(46.4)	4(7.1)	56(100)
Limited logistics expertise, knowledge management practice.	1(1.8)	13(23.2)	14(25)	19(33.9)	9(16.1)	56(100)

Lack of easy communication tools, information asymmetry and trust.	2(3.6)	12(21.4)	26(46.4)	13(23.2)	3(5.4)	56(100)
Inadequacy of government assistance and weak organizational structure.	3(5.4)	5(8.9)	20(35.7)	21(37.5)	7(12.5)	56(100)
Average (%)	**5.05**	**19.8**	**30.51**	**33.76**	**10.88**	**100**

Number of respondents: 56

Source: own survey: 2019

The above table11 depicted the result on examining the current humanitarian logistics coordination challenges in terms of availability of tools, policy and procedures, standardization, complexity of operations, expertise, government assistance and organizational structure where the respondents were requested to answer based on the requirements outlined from literature. The result show on average that 30.51% of respondents replied Neutral, 33.76% of respondents agreed and 10.88% strongly agreed while 19.8% disagreed and 5.05% strongly disagreed in the existence of the challenges in HL coordination based on the items provided. In conclusion most of the challenges outlined are recognized in ERCS.

4.5. Humanitarian logistics coordination success factors

Organization success factors in humanitarian logistics coordination indicate the degree to which coordination efforts are well performed in an efficient and effective manner. Respondents were asked to answer what they feel are their success stories in the implementation of humanitarian logistics coordination. Nine questions were raised for respondents in order to understand and examine what they feel about the extent to which the major success factors outlined are implemented as effectively and efficiently as well. Table 12 below summarizes responses of respondents on HL success factors.

Table 12: Summary of Responses of respondents in logistics coordination success factors

Question Items	SD	D	N	A	SA	Total
	freq. & Percent	freq. & Percent	freq. & Percent	freq. & Percent	freq. & Percent	freq. & Percent
Robust information and communication technology	2(3.6)	9(16.1)	9(16.1)	28(50)	8(14.3)	56(100)
Strategic planning for emergency relief supply chain management.	0	6(10.7)	5(8.9)	34(60.7)	11(19.6)	56(100)
Formalization, standardization documentation of processes.	1(1.8)	9(16.1)	6(10.7)	24(42.9)	16(28.6)	56(100)
Measurement system and continuous improvement strategy	3(5.4)	6(10.7)	6(10.7)	34(60.7)	7(12.5)	56(100)
Coordination in procurement, donation, inventory management	0	2(3.6)	10(17.9)	30(53.6)	14(25.0)	56(100)
Experience in humanitarian assistance, qualifications of staff.	0	7(12.5)	12(21.4)	25(44.6)	12(21.4)	56(100)
Better financial and human resources management	2(3.6)	9(16.1)	15(26.8)	20(35.7)	10(17.9)	56(100)
Management team commitment that assists in coordination.	0	8(14.3)	7(12.5)	31(55.4)	10(17.9)	56(100)
Information and resource sharing practice with other actors/NGO	2(3.6)	10(17.9)	5(8.9)	28(50)	11(19.6)	56(100)
Average (%)	**2**	**13.11**	**14.88**	**50.4**	**19.64**	**100**

Number of respondents: 56

Source: own survey: 2019

The above table 12 depicted the result on examining the major success factors in the implementation practice of logistics coordination in humanitarian logistics management where the respondents were requested to answer based on the requirements outlined from literature. The result show on average that 14.88% of respondents replied Neutral, the majority (50.4%) of respondents agreed and 19.4% strongly agreed while only small portion (13.11%) disagreed and

2% strongly disagreed in the success points raised based on the items provided. Thus it can be concluded that the items outlined as success factors from literature are well recognized at ERCS.

4.6 Humanitarian Logistics coordination performance

The questionnaire includes 16 indicators that used to evaluate the performance of humanitarian logistics coordination in ERCS. The respondents asked to give answer based on five Likert scale (strongly disagree, disagree, neutral, agree and strongly agree).

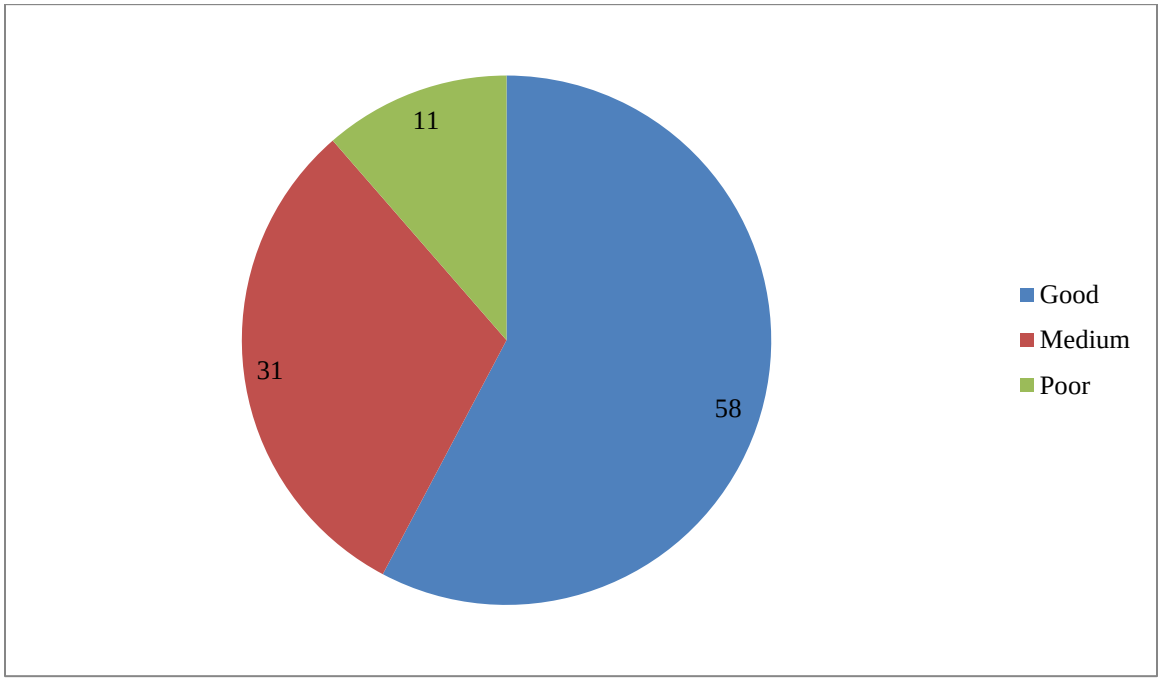


Figure 2: Assessment of HL coordination performance at ERCS, 2019

Source: Own Survey 2019

The findings of this study show that the level of logistics coordination practices and performance using mean+- standard deviation (57+- 0.7) indicates the highest rates were in the range of good position. It ranges from 56.3 through 57.7. It shows that 58% was good, 31% medium and 11% poor as shown in figure 2 above.

Table 13: Humanitarian logistics coordination performance

Descriptive Statistics						
	N	Minimum	Maximum	Mean	Std. Dev.	Variance
Mechanisms/conditions	56	1	5	3.79	.731	.535
Sharing of assets.	56	1	5	3.64	.841	.706
Sharing of services.	56	1	5	3.64	.923	.852
financial res sharing	56	1	5	3.41	1.023	1.046
Assurance of funding	56	1	5	3.14	.923	.852
share of Knowledge	56	1	5	3.54	.852	.726
Partnership conditions	56	1	5	3.27	1.198	1.436
integrated inf. networks	56	1	5	3.63	.906	.820
Trust building level	56	1	5	3.68	.876	.768
Exchange information	56	1	5	3.48	.914	.836
Specialization	56	1	5	3.45	.893	.797
Stable/transparent r/sh	56	1	5	3.70	.851	.724
long term r/ships	56	2	5	3.68	.664	.440
Internal skills/ideas.	56	1	5	3.89	.928	.861
External skill/ideas.	56	2	5	3.68	.811	.658
Process synch.	56	2	5	3.79	.680	.462
HL coordination perf.	**56**	**1**	**5**	**3.58**	**0.733**	**0.839**
Valid N (list wise)	56					

Source: Own Survey 2019

In summary, almost all items treated under logistics coordination variable had mean value of 3.6($\geq$ 3.3). Furthermore, the overall mean value of performance of humanitarian logistics was found to be 3.3 implying Logistics coordination practice at ERCS was good. Partnership building pre-conditions with other stakeholders and assurance of funding preconditions had mean value of 3.14 and 3.27 respectively which is less than the mean value of performance of humanitarian logistics (3.3).

4.7 HL performance

The questionnaire includes 20 indicators that were used to evaluate the performance of humanitarian logistics in ERCS. The respondents asked to give answer based on five Likert scale (strongly disagree, disagree, neutral, agree and strongly agree).

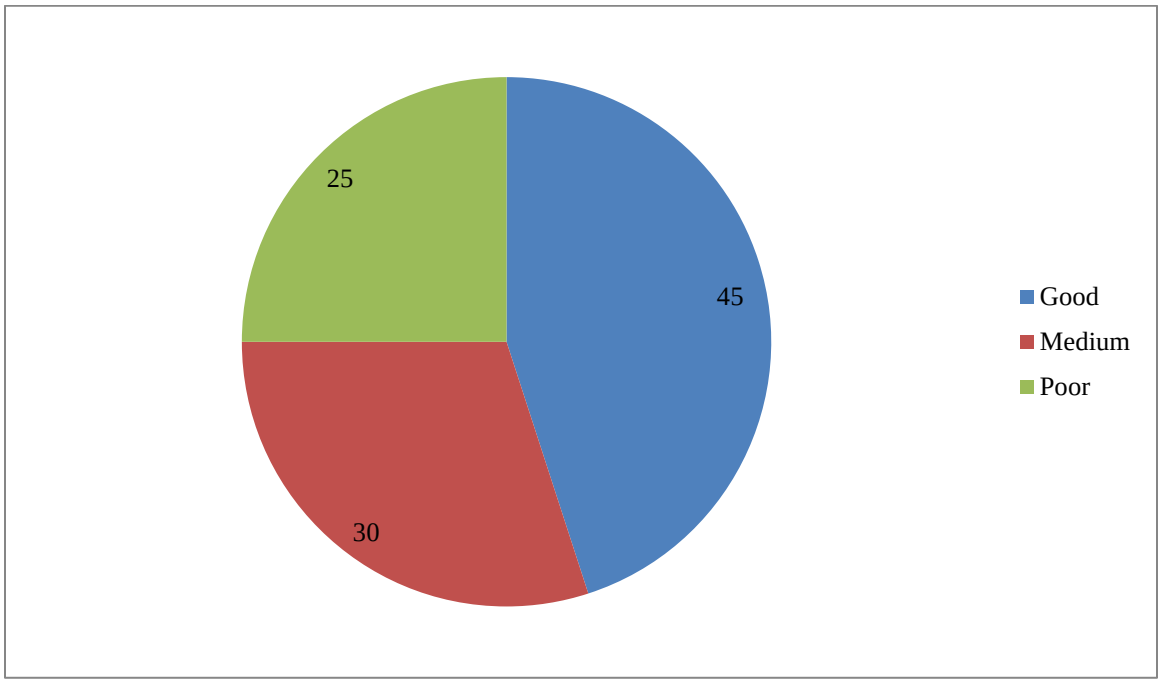


Figure 3: Assessment of HL performance at ERCS, 2019

Source: Own Survey 2019

The findings of this study show that the level of logistics performance using mean+- standard deviation (65+- 0.6) indicates the highest rates were in the range of good position. It ranges from 64.4 through 65.6. It shows that 24% was poor, 30% medium and 45% good as shown in figure 3 above.

Table 14: HL performance

Descriptive Statistics						
	N	Minimum	Maximum	Mean	Std. Dev.	Variance
On-time delivery performance	56	1	5	3.38	.752	.566
Right goods, right place, time.	56	2	5	3.50	.874	.764
Customer satisfaction in coverage	56	1	5	3.50	.915	.836
Sharing of key information, skills.	56	2	5	3.43	1.024	1.049
Distribution/delivery cost reduced.	56	1	5	2.89	1.056	1.116
Overtime hours' reduction.	56	1	5	3.25	1.116	1.245
duplication of efforts in logistics	56	1	5	3.27	.884	.781
Deliver requested and exceptional.	56	1	5	2.88	1.063	1.130
resource/capability sharing	56	1	5	3.54	1.008	1.017
Order fulfillment capacity.	56	1	5	3.29	.948	.899
Quantity of purchased material.	56	1	5	3.41	1.141	1.301
Personnel substitution	56	1	5	3.16	1.023	1.046
Order fulfillment lead times	56	1	5	3.29	1.074	1.153
Promised time delivery normal.	56	1	5	3.50	.953	.909
Promised time delivery emergency.	56	1	5	3.09	1.133	1.283
Replenishment& coverage.	56	1	5	3.29	1.039	1.081
Convenient logistics.	56	1	5	3.43	1.006	1.013
update requesters regularly	56	1	5	3.09	1.149	1.319
Consistent delivery	56	1	5	2.70	.989	.979
Active collaboration	56	1	5	3.30	1.043	1.088
HL performance	**56**	**1**	**5**	**3.26**	**0.874**	**1.029**
Valid N (list wise)	56					

Source: Own Survey 2019

Among items treated under this variable two of them had mean value of > 2.5 and < 3.3, i.e. distribution and delivery cost reduction, employees' overtime hours' reduction, duplication of efforts in logistics management, order fulfillment capacity, delivery within promised time during

emergency, replenishment & coverage, update of requesters regularly, consistent delivery of any given quantity was to a moderate extent. However the mean value delivery of requested items and exceptional requests, consistent delivery of any given quantity and consistent delivery of any given quantity which is 3.0 meaning that the HSC performance in this regard was to a little extent. The overall mean value of performance of humanitarian logistics was found to be 3.3 implying HSC performance at ERCS was to a moderate extent.

4.7.1 Correlation Analysis

This study analyzed relationships by using the correlation analysis, which investigates the strength of relationships between the studied variables. Person correlation coefficients reveal magnitude and direction of relationships (either positive or negative) and the intensity of the relationship (-1.0 to +1.0). Correlations are perhaps the most basic and most useful measure of association between two or more variables (Marczyk et al 2005). According to Marczyk et.al(2005) general guidelines correlations of .01 to .30 are considered small, correlation for .30 to .70 are considered moderate, correlation of .70 to.90 are considered large and correlations of .90 to 1.00 are considered very large. Depending on this assumption, all basic constructs were included into the correlation analysis and a bivariate two tailed correlation analysis was done.

Table 15: Correlation analysis

		HL performance	**Resource sharing**	**Information sharing**	**Organizational relation**
Pearson Correlation	**HL performance**	1	.977**	.983**	.969**
	Resource sharing	.977**	1	.969**	.984**
	Information sharing	.983**	.969**	1	.963**
	Organizational relation	.969**	.984**	.963**	1

Own survey, 2019

Table 15 above shows that coefficients of the three logistics coordination variables are significantly related with the humanitarian logistics performance above the range of 0.963 all significant at the 0.01 level. Regarding the relationship between the logistics coordination variables, table 2 clearly shows that figures with the symbol ** indicate that each of the variables are significantly correlated with each other at a significance level of P<0.01.

4.8. HL coordination challenges

The questionnaire includes 11 indicators that used to evaluate the performance of humanitarian supply chain management coordination in ERCS. The respondents asked to give answer based on five Likert scale (strongly disagree, disagree, neutral, agree and strongly agree).

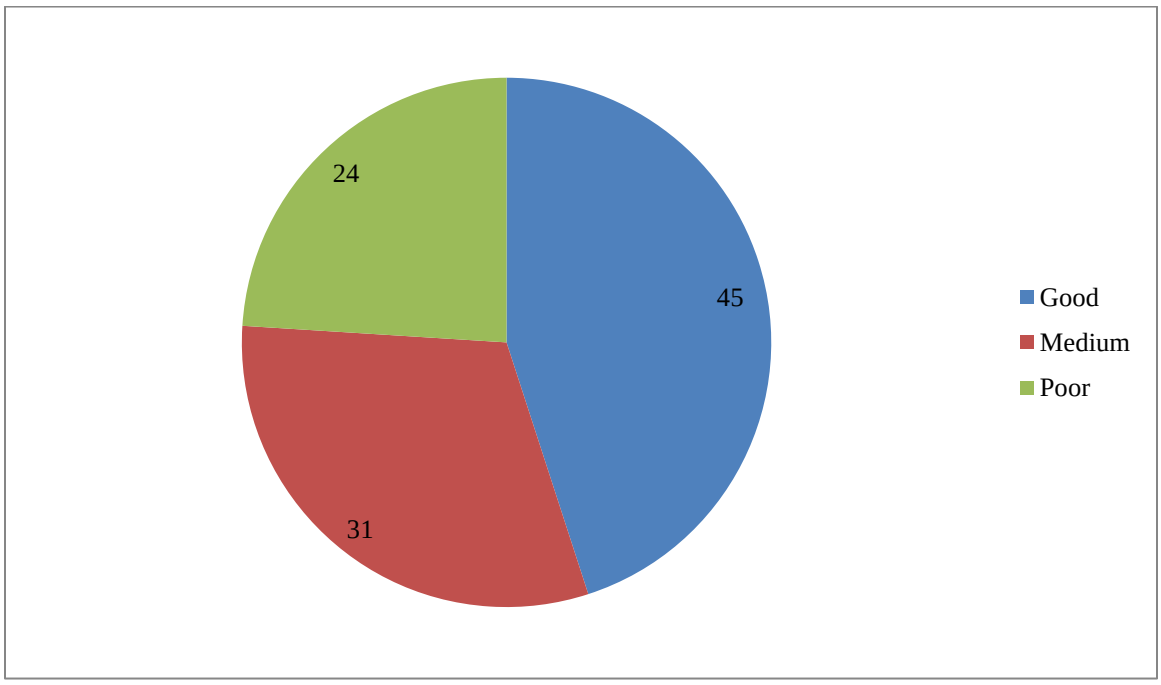


Figure 4 Assessment of HL coordination challenges at ERCS, 2019

The findings of this study show that the level of logistics coordination challenges using median+- standard deviation (36+- 0.5) indicates the highest rates were in the range of medium position. It ranges from 35.5 through 37.1. It shows that 24% was poor, 31% medium and 45% good as shown in figure 4 above.

Table 16: Humanitarian logistics coordination challenges

Descriptive Statistics						
	N	Minimum	Maximum	Mean	Std. Dev.	Variance
Number and diversity	56	1	5	3.27	.944	.891
Urgency of response	56	1	5	3.71	.909	.826
Sufficiency of funding	56	1	5	3.32	1.097	1.204
Absence of policy	56	1	5	3.05	1.166	1.361
Limited personnel	56	1	5	3.11	1.021	1.043
Absence of standards	56	1	5	3.05	1.135	1.288
D/t logistics capability	56	1	5	3.18	1.046	1.095
Uncertainty of decision	56	1	5	3.25	1.132	1.282
Limited log. expertise	56	1	5	3.39	1.073	1.152
Use ICT and trust.	56	1	5	3.05	.903	.815
Limited govt assistance	56	1	5	3.43	1.006	1.013
HL coord challenges	**56**	**1**	**5**	**3.26**	**1.039**	**1.081**
Valid N (list wise)	56					

Own survey, 2019

In summary, most items treated under HSC coordination challenges had mean value of less than 3.3 while Some of the items had mean value of 3.5(>3.3) where the overall mean value of HL performance was 3.3. Furthermore, the overall mean value of performance of humanitarian logistics performance was found to be 3.3 implying logistics coordination challenges at ERCS were recognized to a moderate extent.

4.9 HL coordination success factors

The questionnaire includes 9 indicators that used to evaluate the success factors in humanitarian supply chain management coordination in ERCS. The respondents asked to give answer based on five Likert scale (strongly disagree, disagree, neutral, agree and strongly agree).

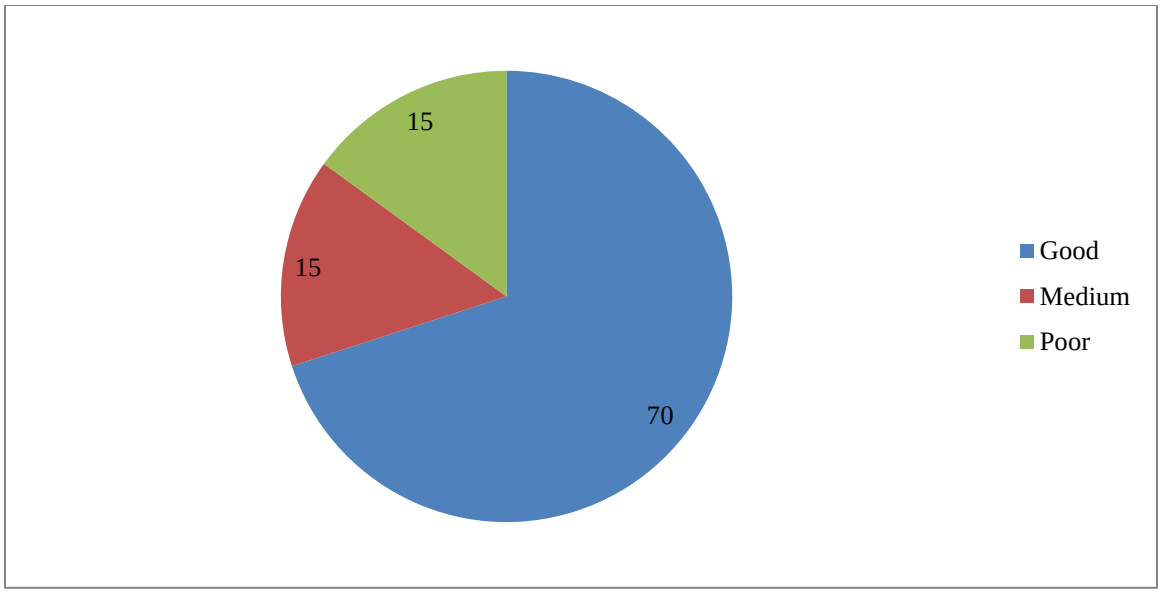


Figure 5 HSC coordination success factors at ERCS, 2019

The findings of this study show that the level of logistics performance using median+- standard deviation (33+ 0.7) indicates the highest rates were in the range of medium position. It ranges from 32.3 through 34. It shows that 15% was poor, 15% medium and 70% good as shown in figure 5 above.

Table 17: HL coordination success factors

Descriptive Statistics						
	N	Minimum	Maximum	Mean	Std. Dev.	Variance
Robust ICT	56	1	5	3.55	1.043	1.088
Strategic planning	56	2	5	3.89	.846	.716
Formalization, standard	56	1	5	3.80	1.086	1.179
Measurement system	56	1	5	3.64	1.017	1.034
Coordination inv. mgt	56	2	5	4.00	.763	.582
Experience	56	2	5	3.75	.939	.882
Better financial/HR	56	1	5	3.48	1.079	1.163
Mgt team commitment	56	2	5	3.77	.914	.836
Info/resource sharing	56	1	5	3.64	1.103	1.216
HL coord success	**56**	**1**	**5**	**3.72**	**0.977**	**0.966**
Valid N (listwise)	56					

Own survey, 2019

In summary, almost all items treated under logistics coordination success factors variable had mean value of 3.7(≥ 3.3). Furthermore, the overall mean value of humanitarian logistics performance was found to be 3.3 implying Logistics coordination success factors at ERCS were recognized to a moderate extent.

4.10. MULTIPLE REGRESSIONS

Multiple Regressions has been one of best statistical tools and frequently used to explain multiple relationships of variables as well as to achieve best prediction of set of variables (Robert 2006). Among different regression models, this study used Multiple Linear Regression to identify the unique contribution of each independent variables of the study.

4.10.1 Testing assumption of multiple regression

4.10.1.1 Normality

Robert (2006) defined normality as the shape of normal distribution of the metric variable and according to Tobachinck and Fidell (2006) it can be measured through statistical tests of Skewness and kurtosis where Skewness measures the symmetry of distribution and Kurtosis measures the peakness of distribution. Moreover, Hair (2010) further underlined the benchmark against which Skewness and Kurtosis values to be checked, and according to this author, any given value of these tests is equal to zero means that the variables are normally distributed and any value other zero implies deviation from normality and yet any value found within the range of ±2.58 is still acceptable. Henceforth, in order to determine whether variables treated under this study were normality distributed, their values of Skewness and Kurtosis were tested and found to be within the acceptable range as can be viewed under Annex3.

4.10.1.2. Multicollinearity assumptions

According to Everitt (2004) and Robert (2006), Multicollinearity is a situation in which the independent/explanatory variables are highly correlated. An ideal approach of measuring the multicollinearity is through examination of the variance inflation factors (VIFs) or the tolerances of the explanatory variables. The tolerance of an explanatory variable is defined as the proportion of variance of the variable in question not explained by a regression on the remaining explanatory variables with smaller values indicating stronger relationships. The VIF of an explanatory variable measures the inflation of the variance of the variable's regression coefficient relative to a regression where all the explanatory variables are independent. The VIFs are inversely related to the tolerances with larger values indicating involvement in more severe

relationships (according to a rule of thumb, VIFs above 10 or tolerances below 0.1 are seen as a cause of concern). In view of this, Multicollinearity test was carried out to all variables of the study as depicted under Annex 4.

4.10.2. Multiple regression analysis result

Regression is a statistical tool that allows us to predict the value of one continuous variable against one or more other variables. When performing a regression analysis each independent variable is associated with specific coefficients in the equation that summarizes the relationship between that independent variable and the dependent variable. Once we estimate a set of coefficients in a regression equation, we can use hypothesis tests and confidence intervals to make inferences about the corresponding parameters in the population. We can also use the regression equation to predict the value of the dependent variable given a specified set of values for our independent variables (Coster 2004).

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
	-14.223	.617		-23.046	.000
resshar	1.787	.129	.379	13.888	.000
infsh	2.068	.063	.577	32.913	.000
orgrel	.229	.130	.043	1.765	.078

a. Dependent Variable: HL perf

As can be viewed from table below, the study model has had an adjusted R^2 value of 0.976 meaning about 98% of the total variability in the HL performance is explained by the model of the study (resource sharing, information sharing and organizational relationship). The remaining 2% of variability in performance of humanitarian logistics is explained by other factors not considered in the study.

Table 18: Summary of Regression model of performance of Humanitarian Logistics

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.988	.976	.976	2.714

Primary data from main survey,2019

Summary of ANOVA Table for Performance of Humanitarian Logistics

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	293742.911	1	293742.911	39874.133	.000
	Residual	7256.252	985	7.367		
	Total	300999.163	986			

Primary data from main survey,2019

To test hypothesis of no linear relationship (R^2=0) between the explanatory/predictor and dependent/predicted variable, the analysis of variance (ANOVA) test is used (Landau Everitt, 2004; Robert 2006). Table 16 above presented the results of F statistics test to show how well the regression model fits the data. If the value of F statistics is big and the significance level is less than 0.05 then the hypothesis of no linear relationship between the predictor variable and predicted variable is rejected. Henceforth, the probability of the F statistic of this study (39874.133) for the overall regression relationship was =0.000 which is less than the level of significance (0.05). And hence, it can be deduced that the regression model fits the data. In other words there is a statistically linear relationship between the set of independent variables (resource sharing, information sharing and organizational relationship) and performance of HL.

4.11 Association of individual independent variables with dependent variable

Table16 presents the coefficient of the HL coordination variables considered in the model of the study. At 95% confidence interval, variable found statistically significant on the t-statistics test are discussed below.

Resource sharing

Holding other factors constant, units change in resource sharing practice leads to an in increase in performance of humanitarian logistics by 0.379units. Apparently, the mean value of 3.7 indicated that the resource sharing practice is slightly higher than a moderate extent. The mean value of organizational resource sharing (3.52) implied that the extent of resource sharing at ERCS is slightly higher than higher than a moderate extent. This is in line with Bölsche(2013), who describe that humanitarian organizations through sharing their resources including data and information of need assessment, experiences and feedback from past events, logistical infrastructure, and aid commodities can improve their performance in terms of cost of operations, responsiveness, and flexibility metrics.

Information sharing

Holding other factors constant, units change in resource sharing practice leads to an in increase in performance of humanitarian logistics by 0.577units. Apparently, the mean value of (3.51) indicated that the extent of information sharing at ERCS were slightly higher than a moderate extent. According to Mansidão, *et al*. (2014) , in humanitarian supply chain the cooperation and exchange of data between actors (enter as well as intra) involved in a disaster/any development program are indispensable in order to effectively respond to the emergency or normal situation request.

Organizational relationship

Holding other factors constant, units change in organizational relationship practice leads to an in increase in performance of humanitarian logistics by 0.043units. However, the mean value of (3.75) indicated that the organizational relationship is higher than a moderate extent. Donald (2003**)** looks for the benefits of partnerships with its customers: Lower costs – due to better coordination, elimination of duplicated effort, less bureaucracy, quantity discounts, and economies of scale, shorter lead-times from improved coordination, procedures and administration, higher quality with uniform standards, collaboration in quality initiatives, less reliance on inspections and commitment to long term improvements.

CHAPTER FIVE

SUMMARY OF FINDING, CONCLUSION AND RECOMMENDATIONS

5.1. SUMMARY OF FINDINGS

Previous studies provided useful findings and suggestions for further research in humanitarian logistics coordination. The literature addresses various aspects of relief sector coordination, highlighting the complexities and challenges associated with coordinating humanitarian assistance. Another group of studies describes coordination efforts observed during previous disaster relief operations and evaluates the factors leading to the success or failure of these efforts. There are also non-academic resources, such as practitioner reports, handbooks, training documents, agency websites, and blogs that describe current practices and emerging initiatives in relief chain coordination. However, the literature lacks studies that broadly and systematically address relief chain coordination in terms of logistics management. However, this study attempts to examine the significance level of each of the three variables associated with HL coordination and performance of humanitarian logistics. Moreover, so far, these variables were not investigated in the ERCS context and hence this study is the first and the original in the case of this organization.

As per the research finding, all of the three variables were found statistically significant on the t-statistics test. Descending from highest to lowest per their significance level factors are listed as: Organizational information sharing, organizational resource sharing. Though statistically insignificant, organizational relationship has positive relationship with humanitarian logistics performance.

- Resource sharing on average was found to be 47.54% to where 67.9% agreed on the existence of mechanisms & preconditions in resource sharing while 53.6%,48.3%,42.9% and 25% agreed on the availability of sharing organizational assets, services, financial resource and assurance of funds, respectively.
- In terms of information sharing practices on average the majority of respondents 34.28% agreed while 37.14% replied neutral. The majority of respondents replied agree in knowledge sharing practice (53.6%), 32.1% responded neutral in partnership building, 39.3% replied neutral and 35.7% responded agree on the availability of integrated information networks. Majority of respondents (50%) agreed in trust building where as

42.9% replied neutral in information exchange practice, 44.6% and 35.7% of respondents replied neutral and agree, respectively in specialization and cross-cutting tasks.

- Related to organization relationship the majority of respondents (54.96%) on average replied agree while 24.64% responded neutral. The majority of respondents replied agreed by 60%, 57.1%, 50%, 46.3% and 60.7% on stable, long term interaction, sharing of internal/external skills and process synchronization respectively.
- Items treated under HL performance were found to be to a moderate with slightly higher than the mean value of HL performance (3.3). However, the mean value of promised delivery performance during emergency , delivery cost reduction, delivery of items requested and consistent delivery were found to be 3, 2.9, 2.9 and 2.7 respectively, which is lower than the average mean.
- Among items included under HL coordination challenges the mean values of urgency of relief response, limited logistics expertise and government assistance & structure were found to be higher than the average with values of 3.7, 3.4 and 3.4 respectively. The other items have less than the average mean value of HL coordination challenges.
- Most of the items treated under HL success factors had mean values higher than the average except better financial and human resource with mean value of 3.5 slightly lower than the average mean (3.71).

5.2 CONCLUSION

- Resource sharing practice in HL coordination at ERCS was implemented at a moderate extent except assurance of funding all the time, partnership preconditions and financial resource sharing which was available only to a little extent.
- Information sharing practice in HL coordination at ERCS was implemented at a moderate extent. However, rate of exchange of information within the company and supply chain partners, partnership building preconditions and rate of specialization & cross-cutting tasks are practiced to a little extent.
- The degree of organizational relationship with other actors in HL coordination efforts was implemented at a great extent at ERCS except that sharing of external skill/ideas, knowledge/experience and long term partnership and team work with other actors was to a little extent.

- In general HL coordination practice /performance and the overall performance of HL at ERCS were implemented to a moderate extent while some of the items under consideration were performed to a little extent as described above.
- HL performance was done to a moderate extent with the exception of promised delivery performance during emergency , delivery cost reduction, delivery of items requested and consistent delivery were to a relatively little extent.
- HL coordination challenges were recognized to a moderate extent at ERCS. Urgency of relief response, limited logistics expertise and government assistance & structure were highly recognized as challenges in logistics coordination.
- HL coordination success factors were recognized to a great extent at ERCS. However, better financial and human resource was recognized to a little extent while coordination in procurement and inventory management was recognized to a higher extent.

5.3. RECOMMENDATION

Resource sharing

- ERCS needs to find mechanisms of assurance of funding, design and implement partnership preconditions with donors and other stakeholders.

Information sharing

- It is vital to increase the amount exchange of information within the company and supply chain partners.
- Rate of specialization in HL management shall also be improved & cross-cutting tasks are well coordinated to enhance performance of logistics coordination.

Organizational relationship

- Sharing of external skill/ideas; knowledge/experience with supply chain partners needs to be enhanced through long term collaboration and partnership with other actors so that logistics coordination is effective and efficient.

HL performance

- ERCS entails to ensure effectiveness, efficiency and reliability to upscale promised delivery performance during emergency, delivery cost reduction, delivery of items as requested and delivery consistency through implementation of HL coordination best practices to optimize HSCM.

HL coordination challenges

- ERCS was faced with different challenges in humanitarian logistics coordination efforts where it entails to establish appropriate policy, procedures and mechanisms to facilitate logistical coordination. Particularly it is important to devise ways to manage urgency of relief response, enhance its expertise capacity in HL management and improve relationship with government & analyze its own structure so that HL coordination efforts are effective and efficient towards HL performance improvements.
- It is vital for ERCS to make strategic relationship with other actors, ensure sufficiency of donors funding for logistics infrastructure, capabilities and long term disaster preparedness. ERCS shall design better standardization of operations and common guidelines and/or service requirements towards logistics coordination optimization.
- ERCS needs to invest in logistics expertise and knowledge management practice due to uncertainty and complexity of decision making regarding logistics operations.

HL coordination success factors

- All the success factors related to HL coordination described are recognized among staff of ERCS. However, the logistics coordination performance and practice in the organization indicate that there should be improvements in logistics coordination and the overall logistics performance. Hence the success stories shall be reviewed to enhance logistics coordination by adopting best practices to enable the logistics management delivers the most efficient and effective service towards humanitarian assistance.

HL coordination and HSC performance

- Improve HL coordination practices particularly enhance the extent of information sharing and resource sharing .It is vital to Act on the major challenges and strengthen success factors.
- In summary it can be observed based on the finding of the study that the level of logistics coordination practice and performance and HL performance at ERCS were to a moderate level. There for the organization entails to further analyze the coordination challenges and success factors in the betterment of its humanitarian logistics performance improvements by implementing and maintaining logistics coordination measurements in terms of resource sharing, information sharing and forging reliable relationship with stakeholders. The major challenges and success stories shall be reviewed to enhance logistics coordination by recognizing the role of coordination and adopting best practices

to enable the logistics management delivers the most efficient and effective service towards humanitarian assistance. It entails to further strengthen HL coordination factors that have significant effect in the betterment of its humanitarian logistics performance by implementing and maintaining logistics coordination measurements in terms of resource sharing, information sharing and forging reliable relationship with other stakeholders.

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ANNEX 1 RELIABILITY STATISTICS

a) Reliability Statistics for resource sharing

Reliability Statistics		
Variable	Cronbach's Alpha	N of Items
Resource sharing	.971	5

Item-Total Statistics				
Resource sharing	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Mechanisms & preconditions	13.84	12.646	.902	.969
Sharing organizational assets.	13.98	11.727	.945	.960
Sharing of services.	13.98	11.218	.939	.960
rate of financial resource sharing:	14.21	10.571	.941	.962
Assurance of funding and partnership	14.48	11.454	.891	.968

b) Reliability Statistics for information sharing

Reliability Statistics		
Variable	Cronbach's Alpha	N of Items
Information sharing	.975	6

Item-Total Statistics

Information sharing	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
share of Knowledge	17.50	21.055	.893	.974
Partnership building pre-conditions	17.77	18.072	.908	.977
integrated information networks	17.41	20.246	.944	.968
trust building level	17.36	20.561	.936	.969
exchange of information	17.55	20.106	.954	.967
Specialization& cross-cutting tasks.	17.59	20.392	.939	.969

c) Reliability Statistics for organizational relationship

Reliability Statistics		
Variable	Cronbach's Alpha	N of Items
Organizational relationship	.966	5

Item-Total Statistics				
Organizational relationship	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
stable and transparent interactions	15.04	8.471	.944	.952

long term relationships and team work	15.05	9.724	.896	.962
share internal skills/ideas/experience.	14.84	8.246	.894	.964
share external skill/ideas/experience.	15.05	8.852	.903	.959
synchronization of processes and activities	14.95	9.470	.942	.955

d) Reliability Statistics for humanitarian logistics performance

Reliability Statistics

Cronbach's Alpha	N of Items
.992	20

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
On-time delivery performance	66.03	284.629	.884	.992
Right goods, at the right place and time.	65.87	279.908	.927	.992
Customer satisfaction in coverage	65.86	280.091	.927	.992
sharing of key information, skills, and teamwork	65.91	274.762	.925	.992
total distribution and delivery cost reduction.	66.44	273.616	.942	.992

Employees' overtime hours' reduction.	66.06	271.819	.959	.992
Duplication of efforts in logistics mgt.	66.10	279.814	.908	.992
Deliver requested items and exceptional.	66.46	273.204	.945	.992
resource/capability sharing	65.80	276.178	.948	.992
Order fulfillment capacity.	66.07	276.500	.931	.992
Quantity of purchased material.	65.90	271.407	.936	.992
personnel substitution	66.18	275.978	.874	.992
Order fulfillment lead times and invent level	66.05	273.634	.907	.992
Promised delivery - normal situation.	65.84	277.790	.948	.992
Promised delivery – emergency situation.	66.23	272.884	.919	.992
Replenishment& coverage.	66.04	273.700	.957	.992
Organized and convenient logistics.	65.90	275.736	.955	.992
update requesters regularly	66.22	270.665	.955	.992
consistent delivery of any given quantity	66.65	274.960	.941	.992
active collaboration	66.02	275.143	.942	.992

ANNEX 2: CROSS TAB RESULT

Work Experience		**Res.shar**	**Inf.shar**	**Org. r/ship**	**HL perf.**
1-5 years	% of Total N	37.50	37.50	37.50	37.50
	Mean	2.81	2.72	3.09	2.34
	Std. Dev.	2.58	2.53	2.3	8.93
5-10 Years	% of Total N	41.07	41.07	41.07	41.07
	Mean	3.8	3.74	4.0	3.6
	Std. Dev.	0.690	1.725	.361	5.75
Above 10 years	% of Total N	21.43	21.43	21.43	21.43
	Mean	4.53	4.69	4.63	4.46
	Std. Dev.	2.18	1.89	1.73	7.26
	% of Total N	100%	100%	100%	100%
Total	Mean	3.72	3.71	3.92	3.49
	Std. Dev.	3.7	4.88	3.29	3.50
Educational level		**Res shar.**	**Info. shar**	**Org. r/ship**	**HLperf.**
Diploma	% of Total N	17.86	17.86	17.86	17.86
	Mean	2.3	2.38	2.69	1.87
	Std. Dev.	2.29	3.02	1.95	6.47
Degree	% of Total N	46.43	46.43	46.43	46.43
	Mean	3.5	3.34	3.74	3.13
	Std. Dev.	1.59	2.34	1.84	8.68
Masters and above	% of Total N	25	25	25	25
	Mean	4.0	4.17	4.15	3.98
	Std. Dev.	.535	1.44	.707	2.48
Others	% of Total N	10.71	10.71	10.71	10.71
	Mean	4.9	4.94	4.93	4.76
	Std. Dev.	.752	.468	.468	4.08
Total	% of Total N	100.0%	100.0%	100.0%	100.0%
	Mean	3.72	3.71	3.92	3.45
	Std. Dev.	3.7	4.88	3.29	3.49

ANNEX 3: NORMALITY TEST RESULT

Normality test

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Ressh	987	5	25	18.62	3.705	-.515	.078	.959	.156
infosh	987	6	30	22.26	4.875	-.258	.078	-.207	.156
orgrel	987	8	25	19.60	3.289	-.571	.078	.568	.156
HLperf	987	22	100	69.56	17.472	-.383	.078	-.364	.156
Valid N (listwise)	987								

ANNEX 4. MULTICOLLINEARITY TEST RESULT

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-19.406	.454		-42.760	.000		
	HLcoord	1.471	.007	.988	199.685	.000	1.000	1.000
a. Dependent Variable: HLperf								

Coefficients[a]										
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	-14.223	.617		-23.046	.000	-15.434	-13.012		
	Ressh	1.787	.129	.379	13.888	.000	1.534	2.039	0.28	5.165
	Infosh	2.068	.063	.577	32.913	.000	1.944	2.191	0.69	4.516
	Orgrel	.229	.130	.043	1.765	.078	-.026	.483	0.36	8.156
a. Dependent Variable: HL Perf										

ANNEX 5. REGRESSION RESULT

```
REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS CI (95) R ANOVA COLLIN TOL
  /CRITERIA=PIN (.05) POUT (.10)
  /NOORIGIN
  /DEPENDENT HL performance
  /METHOD=ENTER ressharing, infsharing, orgrelation.
```

Variables Entered/Removed

Model	Variables Entered	Variables Removed	Method
1	orgrel, infosh, ressh[b]	.	Enter

a. Dependent Variable: HLperf

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.990[a]	.979	.979	2.524	.040

a. Predictors: (Constant), orgrel, infosh, ressh

b. Dependent Variable: HLperf

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
(Constant)	-14.223	.617		-23.046	.000	-15.434	-13.012		
Ressh	1.787	.129	.379	13.888	.000	1.534	2.039	.28	5.165
Infosh	2.068	.063	.577	32.913	.000	1.944	2.191	.69	4.516
Orgrel	.229	.130	.043	1.765	.078	-.026	.483	.36	8.156

a. Dependent Variable: HL perf

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	8.95	98.20	69.56	17.289	987
Residual	-6.588	13.052	.000	2.520	987
Std. Predicted Value	-3.506	1.656	.000	1.000	987
Std. Residual	-2.610	5.171	.000	.998	987

a. Dependent Variable: HL perf

ANNEX 6: CONSENT FORM

Dear Participants, My name is WasihunTaye; I am a student of master's program at Addis Ababa University School of Commerce in the department of logistics and supply chain management. Now, I am conducting a research on the 'Assessment of humanitarian logistics coordination practice, roles and performance in Ethiopian Red Cross Society (ERCS)', as part of the requirements for the degree of masters of art in LSCM. This letter serves to ask consent from you to take part in this research. The purpose of the research is to assess the practice, role and performance of logistics coordination and its support system in humanitarian supply chain management and associated factors among staffs ERCS. It is helpful to explore the practice, role and factors that influence logistics coordination along with the challenges and success factors in the study area as well as solution that can be put forward to address the underlying challenges. This will be critical input for organizations and other stakeholder involved in humanitarian logistics and supply chain management. Thus your participation on this study is very important for achievement of the study.

You are kindly requested to fill this questionnaire and honestly as possible to enable me achieve the objective of this study. The collected information will be treated with maximum confidentiality.

Please, **DO NOT** write your name in any part of this questionnaire; and try to provide all information by ticking **(√)** the most appropriate answer based on the solicited information.

Name of investigator: WasihunTaye

Phone No: +251911-98-30-27

e-mail:watsi2020@gmail.com

Name of advisors: BushaTemesgen(PhD)

Thanks!!!

ANNEX 7: QUESTIONNAIRE

Part 1: demographic characteristics of respondents

Please put tick (√**)** mark in the box according to your choice.

1. Educational status

Diploma ☐ Degree ☐ Masters and above ☐ Others ☐

2. What is your position in the organization?

Manager ☐ Logistics staff ☐ Logistics coordinator ☐ Others ☐

3. Have you used any logistics support systems that aid coordination efforts?

Yes ☐ No ☐

4. Service year in this organization

Less than five year ☐ 5-10 years ☐ Over 10 years ☐

5. Work area

Addis Ababa ☐

Southern Region ☐

Oromia Region ☐

Gambella Region ☐

Afar Region ☐

Part 2: Factors associated with humanitarian logistics coordination.

Please show the extent of your agreement by ticking (√) on the following statements.

Key; SA - Strongly Agree,A – Agree, N – Neutral, D – Disagree, SD - Strongly Disagree

No	**Measurement Items**	**Measurement Scale**				
		SD	**D**	**N**	**A**	**SA**
	Organization resource sharing					
1	We have mechanisms & preconditions to get access to other organizations valuable resources. E.g. outsourcing					
2	We share technologies, expertise, systems and other organizational assets with other NGOs or partners.					
3	We share high volume of distribution center or warehouse through shared services (e.g. order management, transportation, warehousing activities, and value added logistics).					

4	We have high rate of financial resource sharing such as field sites, warehouses and vehicles with other actors.					
5	Donors give assurance of funding all the time and we have donor funding partnership preconditions.					
	Organization information sharing					
6	We share high volume/amount of Knowledge with other actors.					
7	We have a Partnership building pre-conditions					
8	We have a number of integrated information networks horizontally with functional departments & vertically across supply chain.					
9	We have trust building level with stakeholders/actors.					
10	We have high exchange of information within the company and supply chain partners.					
11	We have high rate of specialization & cross-cutting tasks.					
	Organizational relationship					
12	We have stable interactions and transparent inter-organizational relationship between all chain partners.					
13	We have forged and maintained long term relationships and team work with partners in joint logistics set up and implementation.					
14	We share high amount of internal skills/ideas and knowledge/experience.					
15	We share high amount of external skill/ideas, knowledge/experience.					
16	We have synchronization of processes and activities within the company and other partners.					

Part 3: Factors associated with humanitarian supply chain performance.

No	**Measurement Items**	**SD**	**D**	**N**	**A**	**SA**
	Effectiveness					
1	On-time delivery performance, number of delivery per day, and total loading capacity has increased.					

2	Supply chain is able to provide the right goods, at the right place and to the right beneficiaries all the time.					
3	Customer satisfaction is improving in terms of coverage and reaching out to beneficiaries.					
4	There is sharing of key information, skills and incentive realignment and teamwork along the supply chain network.					
	Efficiency					
5	The logistics service has reduced total distribution and delivery cost.					
6	The logistics service has reduced employees' overtime hours.					
7	There is duplication of efforts in logistics management in ERCS.					
	Flexibility					
8	Supply chain is able to deliver full list of requested items and exceptional requests.					
9	There is resource/capability sharing, and job dispatching among different parties.					
10	We have improved order fulfillment capacity.					
11	We have reduced the quantity of purchased material.					
12	There is personnel substitution at logistics coordination level.					
	Responsiveness					
13	Supply chain has minimized order fulfillment lead times, and optimized inventory levels.					
14	Supply chain is able to deliver goods and services within promised time during normal situation.					
15	Supply chain able to deliver goods and services within promised time during emergency.					
16	Supply chain has on time replenishment & coverage.					

	Reliability					
17	Local transportation, warehousing, and distribution system is well organized and convenient.					
18	Supply chain is able to update requesters about the status of order on regular manner.					
19	We have consistent delivery of any given quantity or volume of commodity including unplanned requests for goods & services within planned lead-time or less.					
20	We have active collaboration within and across logistic distribution sectors.					

Part 4: Factors associated with humanitarian logistics coordination challenges.

No	**Measurement Items**	**SD**	**D**	**N**	**A**	**SA**
1	Large number and diversity of Participants.					
2	Urgency of humanitarian relief response and limited time to establish coordination.					
3	Sufficiency of donors funding for logistics infrastructure, capabilities and long term disaster preparedness.					
4	Absence of policy and procedures, limited mechanisms to facilitate logistical coordination.					
5	Limited personnel dedicated to logistics coordination.					
6	Absence of standardization of operations and common guidelines and/or service requirements towards logistics coordination					
7	Different logistics capability, size, authority, organizational structure, political position and level of experience among actors.					
8	Uncertainty and complexity of decision making regarding logistics operations.					
9	Limited logistics expertise and knowledge management practice.					

10	Lack of easy to use information sharing and communication tools, information asymmetry and a lack of trust among actors.					
11	Inadequacy of government assistance and weak organizational structure that facilitate regular and appropriate interaction.					

Part 5: Factors associated with humanitarian logistics coordination success factors.

No	Measurement Items	SD	D	N	A	SA
1	Robust information and communication technology					
2	Strategic planning for emergency relief supply chain management.					
3	Formalization, standardization and documentation of coordination in logistics processes.					
4	Existence of measurement system and continuous improvement strategy in logistics coordination.					
5	Coordination in procurement, donation management, inventory management, risk and need assessment.					
6	Experience in humanitarian assistance and high levels of qualifications of staff.					
7	Better financial and human resources management in logistics coordination.					
8	Management team commitment that assists in coordination.					
9	Information and resource sharing practice with other actors/NGO and local community.					